APPENDIX C

VEGETATION AND SOILS MAPPING AND ANALYSIS

MAPPING AND ANALYSIS
VEGETATION AND SOILS
LAKEBELT ECOLOGICAL STUDIES, DADE COUNTY

Final Report

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Executive Summary

In order to evaluate a proposed limestone mining plan for the Lakebelt Region in northwest Dade County, Florida, the Department of Environmental Resources Management of Dade County (DERM), with funding assistance from the South Florida Water Management District, the Army Corps of Engineers and the South Florida Rockmining Coalition, proposed to assess the existing function and quality of freshwater wetlands in that region. Among the components of that assessment were the mapping and analysis of vegetation and soils, the analysis of existing and historical distribution of *Melaleuca quinquenervia*, and an analysis of factors which might be influencing the distribution of vegetation in the study area, including topography, soil type and hydrology. Other researchers collected data on wildlife and lake and littoral communities.

Cover types were defined by an interagency task force. They were digitized from aerial photographs and then ground-truthed. A soil map was created from existing information, and soil depths were measured. Historical analyses of *Melaleuca* infestation in both the entire Lakebelt region and eight sections of the study area were conducted by comparing digitized maps of aerial photographs from 1963 to 1992. Analyses of correlations between *Melaleuca* cover and soils, topography, and hydrology were performed.

Approximately 30% of the Lakebelt Region has been altered by man. Most of this activity, dominated by rock mining and agriculture, has occurred north of Okeechobee Road and along the eastern side of the study area. Natural cover types, the remaining 70% of the study area, are found primarily in the Pennsuco Wetlands and in the western areas along the Dade-Broward Levee. Prairie with varying degrees of *Melaleuca* infestation was the prevalent natural community type. Tree Islands and Willow Heads, the only indigenous wetland forested vegetation community types found, occupied less than 1% of the study area.

Of the 307 plant species found in the study area, 15 are categorized as threatened by the State of Florida. Nine are ferns and six are terrestrial orchids, all of them relatively widespread and common in southern Florida despite their threatened status. Two other species categorized as Commercially-Exploited by the State of Florida are relatively common in the Lakebelt Region. Five species of plants are categorized as Rare by Dade County, while four species are classified as Uncommon to Common. Two of the species protected by Dade County (listed as Uncommon to Common) are endemic in freshwater wetland areas in southern Florida.

Twelve soil types were identified. Lauderhill Muck, Depressional was the most common (57%) in the study area. Soil depths ranged from 22 to 132 cm. *Melaleuca*, which was almost absent in 1963, now covers approximately 45% of the study area, and the rate of expansion has been exponential. No correlation was found between *Melaleuca* expansion and soil type, soil depth, land elevation or hydrology. In portions of the Lakebelt Region, *Melaleuca* appears to be invading from east to west.

1.0 Introduction

1.1 Institutional setting: On April 8, 1992, Governor Lawton Chiles established the Northwest Dade County Lakebelt Plan Implementation Committee in order to evaluate a proposal by the South Florida Limestone Mining Coalition (SFLMC) to excavate approximately 30,000 acres of freshwater wetlands in northwest Dade County. To date, more than 4,000 acres of Northwest Dade County have been mined for the extraction of limestone. Each year about 300-400 acres of freshwater wetlands are converted to deep water lakes. The end result is a mosaic of individual lakes and artificially constructed wetlands (littoral areas).

On October 28, 1992, the U.S. Army Corps of Engineers (USCOE) extended an invitation to the agencies on the Lakebelt Plan committee to participate in the development of a programmatic Environmental Impact Statement for the proposed Lakebelt Plan. The Directors of the Dade County Planning Department and Dade County DERM were appointed to serve on the Committee.

Several studies were identified by the agencies as needed to properly assess the potential benefits and impacts of the proposed plan. The recommended studies included water quality and water quantity evaluations, an ecological impact assessment, and a land use planning evaluation.

The Department of Environmental Resources Management of Dade County (DERM) prepared a scope of services to evaluate the existing function and quality of freshwater wetlands within the Lakebelt Region. Existing vegetation had to be mapped and quantitative data had to be collected on wildlife populations using the area. These data were to be used to predict future environmental conditions under various planning scenarios involving the excavation of deep water lakes and the protection and enhancement of adjacent wetland areas.

EAS Engineering, Inc. was selected to conduct an inventory of the Lakebelt Region, to include: 1) mapping the region's vegetation, soils and topography, 2) analyzing the existing and historical distribution of the Australian melaleuca tree, *Melaleuca quinquenervia*; and, 3) examining the data for any correlations between *Melaleuca* distribution and soil type, topography or hydrology.

On March 26, 1995, EAS presented a Year 1 report on cover types and soil types (EAS Engineering, 1995a). On December 4, 1995, we presented a Melaleuca Expansion Rates report, and on December 14, 1995, we presented a Year 2 Final Report on the vegetation, soils, and mapping of the study area (EAS Engineering, 1995b). The present Final Report uses and refines the previously reported data and supersedes all of the previously submitted reports.

1.2 Geographical setting: The Lakebelt Region is a mixture of ecologically pristine, degraded, and developed areas covering approximately 48,000 acres. Its boundaries are the Dade-Broward Boundary/Snake Creek Canal to the north, Tamiami Trail to the south, the Homestead Extension of the Florida Turnpike to the east and Krome Avenue to the west (Figure 1).

1.3 Background

Since its introduction into South Florida in 1906, *Melaleuca* has become established in areas that were historically wetlands, especially those stressed by reduced hydroperiods. This species negatively impacts wetland function, thus threatening the core of the Everglades ecosystem. *Melaleuca* drastically changes ecosystem structure and dynamics. Forests replace gramineous marsh, thus changing animal use; leaf litter and woody debris change relative soil elevation and hence hydrology. Tree weight can compress underlying peat deposits; organic matter results in heavy fuel loads of very combustible materials, leading to very hot fires; higher leaf areas increase evapotranspiration and lower water tables; and leaf litter may produce allelopathic substances which, combined with dense evergreen shade, may eliminate understory species. For all this, *Melaleuca* has been declared a Federal Noxious Weed and a Florida Prohibited Aquatic Plant. These regulations prohibit its importation into the United States and its transportation throughout Florida, respectively (Bodle et al 1994). The spread of *Melaleuca* has been described as explosive with an accelerating rate of spread (Hofstetter 1991, Cost & Craver 1980, Laroche & Ferriter 1992).

Abiotic Factors: Abiotic factors that have influenced the current distribution of the cover types in the Lakebelt Region include (1) generalized historical alteration (lowering) of the water table associated with canal and drainage ditch excavations and berming; (2) rockmining throughout the eastern portion of the study area; (3) development and urbanization, including road building; (4) construction of high voltage electrical power transmission corridors; (5) construction and operation of a public wellfield; and (6) periodic uncontrolled wildfires that have historically ravaged the study area.

The primary effects of these abiotic factors in the study area have been to shorten hydroperiods and to disrupt and redirect surface water sheet flows from historical conditions. These modifications have resulted in the alteration of the historical long hydroperiod wetlands to shorter hydroperiod prairies, causing shifts in vegetative species composition and species richness. The rockmining industry has created extensive areas of deep water habitat, which do not naturally occur in southern Florida.

A secondary result of this human activity has been the creation of extensive areas of disturbed land which have been colonized by weedy and/or noxious exotic vegetation. Another byproduct of the ongoing rockmining is the creation of temporary shallow water bodies which are colonized by numerous wetland species.

Wildfires are a normal part of the cycle of the natural habitats within the study area. However, the alteration of hydroperiods and water levels, coupled with the extensive invasion of the area by *Melaleuca* (discussed below), and drought conditions which occurred in the late 1970s and late 1980s resulted in extremely hot wildfires in portions of the study area. In many areas the organic substrate burned down to the rock layer. These effects were particularly severe in the vicinity of the Northwest Wellfield. Furthermore, many of the tree island habitats have been severely impacted by wildfires, resulting in an invasion by exotic species and shrinking of the areas covered by tree islands.

Biotic Factors: The principal biotic factor affecting the study area is the rapid colonization of prairie wetland habitats by the noxious exotic tree *Melaleuca*. *Melaleuca* expansion in the Lakebelt Region has been identified as a primary environmental concern. This study was designed to shed more light on the rate of *Melaleuca* expansion and to try to determine what factors might be affecting it.

2.0 Methods

2.1 Vegetation and soils

2.1.1 Vegetation: During the formulation of the Lakebelt Study, an interagency task force defined eighteen categories of cover types that would be delineated during the vegetation mapping phase of the project. Those cover types were divided into two basic groups, natural cover types and man-altered cover types.

Natural cover types comprise a spectrum of jurisdictional (Florida Department of Environmental Protection, South Florida Water Management District, Dade County Department of Environmental Resources Management, and U.S. Army Corps of Engineers) wetland prairie associations that were assigned to one of four categories, based on the degree of invasion by *Melaleuca*: <10% *Melaleuca*; 10%-50% *Melaleuca*, 50%-75% *Melaleuca* and Dense *Melaleuca* (75%-100%). Dense Melaleuca Saplings (DMS) was a category added later to include prairie areas having a dense canopy of small *Melaleuca* saplings. Also among the natural cover types are forested Willow Head and Tree Island communities.

Prairie (P): Except for Dense *Melaleuca*, the prevalent community type within the Lakebelt Region is prairie, which includes both short hydroperiod (three to six months) and longer hydroperiod (six to nine months) wet prairie communities dominated by graminoids and other herbaceous species, occurring on muck-dominated soils (Richter et al., 1990). In the Pennsuco wetlands west of the Dade-Broward Levee, the hydroperiod ranges from six to nine months (ibid). Within the majority of the Lakebelt Region, the graminoid Sawgrass (*Cladium jamaicense*) is the dominant indigenous species of this prairie community, with patchy areas, especially in the southern areas of the Lakebelt Region containing a significant component of one or more of the following graminoid species: Beardgrass (*Andropogon glomeratus*), Broomsedge (*Andropogon virginicus*), Sheathed Cyperus (*Cyperus haspan*), Erect Panicum (*Dichanthelium erectifolium*), White Top (*Dichromena colorata*), Spikerush (*Eleocharis cellulosa*), Elliott's Lovegrass (*Eragrostis elliottii*), Sugarcane Plumegrass (*Erianthus giganteus*), Muhly (*Muhlenbergia capillaris*), Red Top Panicum (*Panicum rigidulum*), Bluejoint Panicum (*Panicum tenerum*), Spreading Beakrush (*Rhynchospora divergens*), Littleseed Beakrush (*Rhynchospora microcarpa*), Tracy's Horned Rush (*Rhynchospora tracyi*), and Narrow Beardgrass (*Schizachyrium* *rhizomatum*). Common herbaceous components of this community include Coinwort (*Centella asiatica*), String Lily (*Crinum americanum*), Oak-leaved Fleabane (*Erigeron quercifolius*), Fennel (*Eupatorium leptophyllum*), Yellowtop (*Flaveria linearis*), Marshelder (*Iva microcephala*), Creeping Charlie (*Phyla nodiflora*), Marsh Fleabane (*Pluchea rosea*), Swamp Mermaid (*Proserpinaca palustris*), and Water Pimpernel (*Samolus ebracteatus*). Numerous other herbaceous and graminoid species are present in this community. There is substantial patchiness of plant species within this prairie community, attributable to differences in soil type and depth, surface water depth, and perturbation factors.

Within the prairie community, indigenous tree and shrub species occur sporadically. The most prominent species include Buttonbush (*Cephalanthus occidentalis*), St. Andrew's Cross (*Hypericum fasciculatum*), Dahoon Holly (*Ilex cassine*), Wax Myrtle (*Myrica cerifera*), and Swamp Bay (*Persea palustris*). Coverage of Melaleuca in this habitat type is less than 10%.

Also within the prairie community, and most prominently in the prairies of the Pennsuco Wetlands, is a subcommunity type called "flats" which is quite different both floristically and structurally from the surrounding prairie. Flats tend to be very small and dominated by herbaceous and graminoid species but do not include Sawgrass. The vegetation is usually substantially shorter and less dense than in the surrounding prairie. Periphyton usually attains its greatest development in the flats subcommunity type. Netted Shy-leaf (*Aeschynomene praetensis*), String Lily, Spikerush, and Tracy's Horned Rush are among the most common species in these areas.

Prairie with *Melaleuca:* *Melaleuca* has invaded the prairie wetlands very extensively in southern Florida, and occurs in varying amounts throughout the study area. P50, or prairie with 10% to 50% *Melaleuca* retains its primary vegetative character as prairie, with only minor diminishment in species richness and dominance of graminoid and herbaceous vegetation. This habitat is characterized by relatively open areas, with small stands of *Melaleuca* scattered randomly throughout the area.

P75, or prairie with 50% to 75% *Melaleuca*, also retains some of its prairie characteristics, but there is a more noticeable loss of species richness and dominance by herbaceous vegetation.

Dense *Melalaleuca* Forest: *Melaleuca* has attained forest stature or density in many areas of the Lakebelt Region. Two categories of so-called dense *Melaleuca* have been mapped for this study.

Dense *Melaleuca* Forest (DM) is a closed canopy stand of Melaleuca which can attain heights of 30 to 40 feet. Within these stands, the density of trees can vary from relatively open to very dense thickets. By definition, these areas range from 75% to 100% *Melaleuca* canopy coverage. The understory is very sparse, and contains a few of the prairie species, most of which exhibit etiolation and other signs of diminished light levels. The most common understory species are Royal Fern (*Osmunda regalis*), Swamp Fern

(*Blechnum serrulatum*) and Shield Ferns (*Thelypteris* spp.). Occasional Wax Myrtles, Red Bays, Dahoon Hollies and *Baccharis* spp. are also found in the understory.

Dense *Melaleuca* Saplings (DMS) refers to *Melaleuca* forest that has attained only a height of about 15 feet or less. It is characterized by having an extremely high stem density and, consequently, there is liTtle opportunity for other species to occur in this habitat. Most of this habitat represents areas where *Melaleuca* is recovering from the hot wildfires of 1990. DMS was identified in the aerial photographs as follows: if individual mature trees could be identified in areas whose signature corresponded to dense Melaleuca, then it was classified as DM; if no individual trees were discernable, then it was classified as DMS.

Tree Islands and Willow Heads: These are the only two categories of indigenous wetland forest habitat in the Lakebelt Region.

Tree Islands (TI) are dominated by Red Bay, Coastal Plain Willow (*Salix caroliniana*), Brazilian Pepper (*Schinus terebinthifolius*), West Indies Trema (*Trema micrantha*), Groundsel Tree (*Baccharis glomeruliflora*), Shrubby Waterprimrose (*Ludwigia octovalvis*) and Wax Myrtle. Numerous other species of trees, shrubs and ground cover are also present in the tree island habitat.

Willow Heads (WH) are areas dominated by Coastal Plain Willow.

Man-altered cover types comprise water bodies (canals, lakes, impoundments, temporary ponding, etc.), modified habitats (agriculture, lake perimeter or scarified areas surrounding lakes), developed areas, disturbed prairie, disturbed prairie with 10%-50% *Melaleuca*, disturbed prairie with 50%-75% *Melaleuca*, vegetated disturbed areas (some of which are not jurisdictional wetlands), and the Florida Power & Light high voltage transmission lines which occur within the study area. The "disturbed prairie" category refers to prairie whose soils were modified in the past by human activities, such as rock plowing, mowing or cattle grazing, but which are again developing wetland characteristics.

Lakes (L) include all of the quarry lakes associated with limestone mining. These lakes are up to 60 feet deep and most of them contain no vascular plants.

Lake Perimeter (LP) includes the cleared, unvegetated work areas surrounding the quarry lakes.

Canals (C) consist of canals, ditches and other excavated water bodies which contain at least some standing water all year round. This cover classification includes the Dade-Broward Levee, which separates the western third of the Lakebelt Region from the eastern two-thirds. It also includes the Tamiami, Miami and Snapper Creek canals. Cattails (*Typha dominigensis*) and Spatterdock (*Nuphar luteum*) typically dominate canal habitats.

Other Water (W) includes shallow impoundments and temporary ponds which are associated with ongoing rock mining and which occur in and around lake perimeters. It also includes a number of wetland mitigation ponds. They are often vegetated with a variety of annual and short-lived wetland species that tolerate extremes of fluctuating water levels. Typical species associated with this cover type are Matted Figwort (*Bacopa monnieri*), Tropical Flatsedge (*Cyperus surinamensis*), Purple Spikerush (*Eleocharis atropurpurea*), Hurricane Grass (*Fimbristylis spathacea*), Umbrella Sedge (*Fuirena breviseta*), Marsh Pennywort (*Hydrocotyle umbellata*), Large-headed Rush (*Juncus megacephalus*), Shrubby Water Primrose, Fall Panicum (*Panicum dichotomiflorum*) and Marsh Fleabane (*Pluchea odorata*).

Agriculture (AG) includes pasture, improved pasture, tree farms and nurseries, sugar cane fields and other row crops.

FPL Right-of-Way (FPL) was distinguished as a separate cover type because it is kept clear of *Melaleuca* by periodic maintenance, but otherwise is left as functioning wetland habitat. The FPL right-of-way divides most of the Lakebelt Region in a north-south direction.

Developed Areas (DV) include all areas that have been developed for commercial, institutional or residential use, including roads, buildings, parking lots, etc. Vegetation in these areas usually consists of exotic landscaping plants, with exotic and nuisance species dominating fencelines and other poorly maintained areas.

Disturbed Areas (D) include both forested and open upland areas that have been modified by man. Forested disturbed areas are dominated by noxious, exotic vegetation such as Brazilian Pepper, *Melaleuca*, Australian Pine (*Casuarina equisetifolia*), Beefwood (*Casuarina glauca*) and the indigenous West Indies Trema. These areas usually include canal berms, roadside vegetation, and abandoned fields. The open disturbed land has no forest canopy, but can be heavily overgrown by shrubby, weedy vegetation. It includes roadside areas, portions of active rock quarry operations and old abandoned fields.

Disturbed Prairie (DP), Disturbed Prairie with Melaleuca (DP50) and Disturbed Prairie with Melaleuca (DP75) include those areas that were cleared in the past (by mowing, plowing, grazing, etc.) but are now reverting to prairie wetlands, with levels of *Melaleuca* infestation similar to those described above for the natural prairie cover types.

Cover types were digitized from Dade County 1:3600 (1"=300') uncontrolled, black and white aerial photographs (1992 and 1994) by an EAS AutoCad specialist who was trained to identify their different signatures by the same experienced field biologist who identified and ground-truthed the cover types. Eighty-one aerial photographs were digitized - one for each section in the Lakebelt Region (Figure 2). Cover types were identified by their "signatures", i.e. the grey scale and texture of the area on the photo. Individual trees and the edges of stands of tall trees could be identified by their shadows. Different types of forest, e.g. Brazilian Pepper (*Schinus terebinthifolius*), Australian Pine (*Casuarina* *equisetifolia*) and *Melaleuca*, have distinctive textures that can be recognized with practice. Deep, clear lakes are dark; shallow or turbid water is light. Periphyton gives prairie a mottled appearance. Grazed pasture has a very smooth, even texture, with individual trees standing out in contrast. The neat, linear features of row crops and tree farms are readily apparent.

It should be noted that this vegetation mapping effort was undertaken to assist in the planning of a large scale project (almost 50,000 acres). The information presented in this document should not be used for site-specific permitting decisions. Independent vegetation mapping at a scale suitable for the individual project should be required for permitting purposes.

Once all of the aerials had been digitized and merged, the AutoCad drawing was converted into a GIS (Geographic Information System) ArcInfo coverage for analysis and display. Minor spatial adjustments were made to the coverage using features digitized from USGS Quad Sheets and several reference locations identified with GPS (Global Positioning System) equipment. These adjustments were necessary to correct the distortions and frequent lack of control points on the Dade County aerials.

Despite the fact that a number of cover types could be distinguished fairly readily on the aerial photographs, there were areas that were difficult to identify with certainty. Access to much of the area was very difficult. Some areas were visited by ground crews as part of this study, primarily the twelve Everglades Research Group wildlife stations, two tree islands and a large area of P50. Mark McMahon, of Biological and Environmental Consulting, had visited other areas of the Lakebelt Region during previous studies. All of these ground-truthing sites are shown in Appendix A.

The majority of the ground-truthing effort consisted of a helicopter overflight covering the entire study area. The helicopter ground-truthing was conducted toward the end of the Year 1 mapping effort, after all of the cover types had been digitized, converted to a GIS coverage and attribute- coded for their cover type. The entire Lakebelt area was flown in an east-west direction along section lines. Individual sections were circled when necessary to clearly determine their characteristics. Several times the helicopter landed to verify observations made in the air. As a result of this effort, many changes were made to the maps. Polygons were added and eliminated and cover type assignments were changed. This effort consumed over six hours of flight time. This aerial "truthing", in our opinion, provided us with much better spatial coverage of the Lakebelt Region than could be covered from the ground. The aerial effort also allowed us to get a good perspective on the homogeneity, or lack thereof, of the various cover types.

During the analysis of historical changes in cover type described below, it became apparent that some features, such as canals and tree islands, had been obscured by other types of vegetation in the 1992 aerials and therefore were not correctly represented. Canals, for example, were often obscured by overhanging forest canopy - often Brazilian Pepper or Australian Pine growing on the canal banks - and had therefore been recorded as "Disturbed". Tree Islands in a number of cases had been confused with *Melaleuca* because the signatures are not very different. This was corrected by reviewing the earlier aerials and modifying the 1992 coverage accordingly.

Canals: Our 1963 coverage was compared with a Canal coverage provided by DERM. For any area where a canal was missing from the 1963 coverage, but present in the DERM Canals coverage, the aerials were consulted. If evidence of a canal was present, the canal was digitized into the coverage. It was assumed that if a canal was present in 1963, it was still present in the 70's, 80's, and 90's, even though vegetation might obscure it in the aerial photo. All such canals were added to the subsequent coverages.

Tree Islands: If Tree Islands were present in our 1963 coverage, we re-examined the aerials for the 70's, 80's, and 90's for those very same locations, in order to verify whether or not that cover type was still present.

Although the Year 1 report was intended to present existing conditions in the Lakebelt Region, the findings in the Year 1 report were refined during the historical analysis as described above. These adjustments are reflected in the data presented on the right hand side of Table 1 (Previously Reported Acreages). The Year 1 data summary is superseded by this report.

In January, 1996 DERM provided us with their Level II Arc/Info export files for Edge-of-Pavement, Centerlines, and Water Bodies for the Lakebelt Region and asked us to adjust, or "rubbersheet", our current lakebelt coverage to the Edge-of-Pavement. Two or three initial rubbersheeting adjustments were performed by linking permanent, unmistakable features such as road intersections, especially along the borders of the Region. Then, section by section, the coverage was examined for agreement of DERM's edge-of-pavement with our roads, and adjusted manually by moving and/or re-drawing when necessary. Aerial photographs were constantly referred to during this process as a double check against incorrect alterations to shape or cover-type assignment. Roads in DERM's coverage were added to our coverage, when the aerials confirmed that they were present but had not originally been digitized, unless the roads were part of a Lake Perimeter and were not distinguishable from surrounding scarified cover. Canals were also added, as well as other water bodies, if their presence could be confirmed on aerials. Table 1 compares the recent corrections in cover type acreages with the values previously presented in the Year 2 Report (EAS Engineering, 1995b). The differences are negligible. All of the analyses presented in this report were based on the earlier coverages because the corrections were continuing while the analyses were being performed.

During the course of this study, separate contracts were awarded to the Everglades Research Group and to Nova Southeastern University Research Group to examine the wildlife and littoral flora and fauna in the Lakebelt Region, respectively. The locations of the sampling stations for those studies are shown in Figure 3. The wildlife stations were established in such a way as to be able to relate habitat utilization by wildlife to cover types identified in this report. During the final stages of this study, it had become apparent that several cover type designations assigned by the Everglades Research Group (ERG), which was performing the wildlife analysis, differed from those of EAS. Those discrepancies are discussed in Appendix B.

2.1.2 **Plant species:** While conducting the ground-truthing and the other field measurements described in this report, a list of plant species observed in the field was compiled (Appendix D). We also noted relative abundance, federal and State wetland status, the types of habitat where they were most commonly found, and the level of protection given to the rarer species by different agencies.

2.1.3 Soil types: The coverage for the Lakebelt Region Soil Types was created from DERM's Arc/Info export file LB_SOILS.e00. This coverage was clipped to the extent of EAS' Lakebelt coverage. The EAS coverage was used to update the water bodies (soil type 'Water' in DERM's soil coverage) because EAS' coverage was more recent. Soil type designations follow those of SDSWCD (1994).

2.1.4 Soil depths: For this study, soil depths were measured in 1994 and 1995 in sections 21-53-39 and 4-53-39 (Tree Islands) and in Section 16-53-39 (P50) as well as at twelve of the Environmental Research Group's wildlife stations in Sections 10, 15, 20, 27, 28 and 29 of Township 52 South, Range 39 East.

Soil depths were measured during GPS data collection at the twelve wildlife stations. Five probes were made in the vicinity of each station using a calibrated steel rod. Depths were also measured at one P50 station and two tree island (TI) stations along transects established in each cover type, with replicate probes made at approximately 100 meter intervals along each transect. The replicates were averaged at each station.

Since most of our ground-truthing was done by helicopter, which prevented us from gathering more exhaustive data, we present supplemental data in Appendix H: soil depths taken in 1987 in Section 21-53-39 (Cappelletti Brothers), 23-52-39 and 33-53-39 (Rinker) in 1990, 1991, and 1992 respectively, all of them taken in conjunction with HEP analyses performed to support mining applications. Soil depths measured during a 1987 Special Area Management Plan (SAMP) study of four sections: Govt. Lot 6-53-39 and Sections 6-53-39, 20-52-39, and 20-53-39 (Richter et al., 1990) are also provided in Appendix H. Soil depths in the studies presented in Appendix H were probed along measured transects established in different cover types. Most transects were 100 m long with measurements made every 10 m. Soil depths were measured by inserting a PVC rod perpendicularly into the soil until it hit bed rock. After retrieving the rod, the distance between the end of the rod and the mud mark was measured with a tape measure. Surface water level was not taken into consideration when recording soil depths. Much of this ancillary soil depth data could not be applied to this study because the cover type categories do not match the categories used in this study, however the soil depth is presented by section in Appendix H.

2.2 Existing and historical *Melaleuca* distribution

Melaleuca expansion was examined using two different approaches: a region-wide study and a more intensive analysis of eight representative sections.

2.2.1 Region-wide study: Cover type changes over four decades were studied by comparing the digitized coverages created from aerial photographs of the entire Lakebelt Region. Beginning in 1963 (the year in which Dade County began its county-wide systematic aerial photographic coverage), 81 aerial photographs, one for each section within the Lakebelt Region, were obtained for each decade. The representative years chosen were 1963, 1975, 1984, and 1992. In Figure 9 and Tables 4 and 4a, the time periods are presented as decades (1960's, 1970's, etc.). For the graphics (Figure 10) and statistical analyses, however, the actual years were used as the "time" variable.

Because of the large scale of this analysis (324 aerial photos, one square mile each) and the inability to ground truth historic aerial photos, a reduced set of cover types was used. The 18 cover types used to inventory vegetation and land use were reduced to six:

1) *Melaleuca* Less than 50% (ML50). Relatively open areas with small stands of *Melaleuca*, 0-50%. It includes Prairie (P), Prairie with *Melaleuca* (P50), Willow Heads (WH), Disturbed Prairie (DP), and Disturbed Prairie with *Melaleuca* (DP50).

2) *Melaleuca* (M). Medium to dense *Melaleuca* cover, >50%. This cover type includes Prairie with *Melaleuca* (P75), Dense *Melaleuca* (DM), Dense *Melaleuca* Saplings (DMS), and Disturbed Prairie with *Melaleuca* (DP75).

3) Tree Island (TI). The same as for the vegetation study.

4) Disturbed Areas (D). Primarily upland areas, including canal berms, roadsides in areas of old fields that have been allowed to return to a forest-type habitat, and rock mine spoil areas that have been allowed to revegetate. It resulted from grouping Disturbed, Forested and Open (D), Lake Perimeter (LP), Agriculture (AG), FPL Transmission Corridors (FPL), and Developed (DV).

5) Canals (C). The same as for the vegetation study.

6) Lakes (L). A combination of Lakes (L) and Other Water (W).

Figure 4 shows the Lakebelt Coverage for 1992, with its original 18 cover types merged to form the above six cover types.

Once the cover types were identified and their boundaries marked on the aerials, each aerial was digitized using AutoCAD r.12/13 and converted to an Arc/Info version 7.0.3 coverage. For 1992, the coverage used was that of the vegetation study described above, but reduced to the six cover types chosen for this aspect of the study.

After the preliminary results of the wildlife studies became available, it was suggested that the 50% cutoff point for *Melaleuca* coverage might not be an appropriate threshold from a wildlife perspective. The most noticeable changes in wildlife use of prairie habitat seemed to occur only after *Melaleuca* attained a canopy of 75%. It was therefore suggested that we modify the analysis of *Melaleleuca* expansion over time using <75% and >75% cover as categories rather than <50% and >50%. To see how this would affect the outcome, the Lakebelt coverage for 1992 was reclassified into the 6 categories described above, but this time using a 75% cut-off point for dense *Melaleuca*. Maps of the 50% and 75% levels are compared in Figure 5 and the cover type areas are summarized in Table 2. This analysis revealed that there was very little difference in the two coverages. There was approximately a 10% shift of acreage from dense *Melaleuca* to ML75 (approximately 4,000 acres) after the change. Most of the change occurred in the southwest corner of the study area and in the northern area lying east of the Dade-Broward levee and south of Okeechobee Road. An examination of the historical aerials used in this study revealed that our digitization of the aerials was done fairly conservatively, i.e. the lines separating ML50 from DM were usually drawn somewhere between ML50 and ML75. It was therefore decided to continue the study using 50% cover as the cut-off threshold.

2.2.2 Selected sections study: To analyze in greater detail the vegetation changes through time, eight representative sections were chosen by the interagency scientific committee, in cooperation with the wildlife researchers: 5-52-40, 22-52-39, 30-52-39, 4-53-39, 12-53-39, 28-53-39, 29-53-39, 5-54-39 (Fig. 6). These sections were not chosen randomly, and therefore must not be considered to be a subsample of the entire Lakebelt Study Area for statistical purposes. They were intended to represent the wide range of geographical and environmental settings found within the region. Selection criteria also included the relative amount of development occuring in the sections (minimum development was desirable) and the relative amount of *Melaleuca* occurring in each section by 1992. Since the objective of this study was to analyze *Melaleuca* expansion over time, it was necessary that the selected sections have some *Melaleuca* in them by 1992.

Eight aerials, at intervals approximating three years, were digitized for each section except for sections 5-52-40 and 5-54-39 where only seven were used. The intervals were not uniform because selection of aerials was based on availability and quality of the aerials. The first interval, from 1963 to 1971 (Table 3) was the longest, due to the absence of *Melaleuca* and the lack of regular aerial coverage in the undeveloped portions of Dade County during the earlier years. Other aerials were rejected because they were not clear enough to identify the vegetation, or showed burn scars from wildfires, which obscured the vegetation.

For ease of comparison in Figure 12 and Tables 5 through 12, the "reference years" shown in Table 3 were used to identify the eight time periods. For the graphics and statistical analyses, however, the actual year in which each aerial was flown was used as the "time" variable.

For the regression analyses, acreage of dense *Melaleuca* (>50%) was converted to percent cover to make the data comparable, since the total acreage was not the same for all eight sections. Section 5-54-39, for example, was only a partial section. To eliminate the effects of development, which was occurring in most of the sections during this time period, percent cover for each year was based on the total acreage of undeveloped land in the 1992 coverage for each section, namely, Tree Island (TI) + Prairie with <50% *Melaleuca* (ML50) + Prairie with >50% *Melaleuca* (M). This would tend to overestimate *Melaleuca* invasion rates in the early years before the development occurred, but it would make the data more accurate for the later years, since lakes, canals and some disturbed areas (e.g. developed areas, agricultural areas and lake perimeter) are not potential *Melaleuca* habitat. This approach is consistent with that used by other authors (Laroche & Ferriter, 1992).

2.3 Topography

Elevation contours for the Lakebelt Region were extracted from DERM's AutoCad drawing SFALL.DXF, which was based on a topographic survey conducted for the South Florida Water Management Districty by James Beadman & Associates, Inc. Canals and lakes were added from the 1992 Lakebelt coverage shown in Figure 8. A polygon coverage was created from the elevation contours in one foot increments, except for the 4.0 foot contour, which was incomplete. This coverage does not include the area north of U.S. 27 (Okeechobee Road) because no elevation data were available for that area.

2.4 Hydrology

Annual means of groundwater elevation from 1963 to 1992 for six wells within the Lakebelt Region were obtained from the U.S. Geological Survey (USGS). The wells were G-970, G-972, G-974, G-975, G-976 and G-1488 (Fig. 7). The groundwater elevations for each of those wells were assumed to be representative of the closest of the eight sections chosen for the *Melaleuca* expansion analysis and were matched as follows: G970/5-52-40; G972/22-52-39; G975/30-52-39; G974/12-53-39; G1488/29-53-39; G976/28-53-39 (Fig. 7). Monthly average groundwater levels were calculated for the period 1980 to 1992 and ground elevations at the wells were estiimated using the topographic data discussed in Section 2.3.

2.5 Statistical Analyses

The statistical analyses presented in this report are limited. Contractual and budgetary restraints did not allow us to conduct a thorough statistical analysis. Our analyses were intended only to quantitatively describe the trends we saw in *Melaleuca* expansion over time and to see if any correlations were evident which might explain this expansion. Simple, linear regression and correlation analysis were proposed, rather than more sophisticated, but more technically demanding methods such as polynomial regression or multivariate analysis. Nor were the data tested to determine whether they met the assumptions of regression, namely, linearity, independent and normally distributed Y values, and homoscedasticity (constant variance). Such analyses were beyond the scope of this project.

Statistical analyses included linear regression, analysis of variance (ANOVA) and correlation analysis. SYSTAT for Windows, Version 5 was used for this analysis and for producing the graphs. Transformations were used to improve the linearity of the data if a linear regression failed to show a significant slope. Two transformations were applied: a square root and a log normal transformation.

A probability level of $p = 0.05$ was used to reject or accept null hypotheses. The computer outputs for all statistical analyses are presented as appendices, including regressions that were rejected as being not statistically significant.

Because of the small sample size (four data points for the regionwide analysis of *Melaleuca* expansion and seven or eight points for each of the representative sections), it was decided not to extrapolate the regression formulas for *Melaleuca* expansion beyond the last measurements in 1992 (i.e. prediction of future outcomes).

3.0 Results

The 1992 map of Lakebelt cover types is presented in Figure 8 and the acreage and percent contribution of each cover type are summarized in Table 1. Table 1 also compares the recent corrections in the coverages with those reported in the Year 2 Report (EAS Engineering, 1995b) as discussed in the introduction. The differences are negligible, and all of the analysis that follows is based on the previously reported data on the right hand side of Table 1. Individual maps showing the distribution of each cover type are presented in Appendix C.

Approximately 70% of the Lakebelt Region consists of natural cover types and 30% has been altered by man. The man-altered cover types tend to occur north of Okeechobee Road (U.S. 27) and along the eastern third of the study area, while the natural cover types dominate in the western two thirds of the region.

3.1 Natural cover types

Dense *Melaleuca* (DM) is the most abundant cover type, accounting for 22.2% of the total Lakebelt Region. Prairie (P) is the next largest component of the region, with 15.5% of the total. The distribution of the two covertypes (Appendix C) shows that dense *Melaleuca* dominates the eastern two-thirds of the region, while prairie is dominant in the western one-third, between the Dade-Broward levee and Krome Avenue. Small pockets of prairie also remain north of Okeechobee Road and in the southeast corner of the Lakebelt Region.

Prairie with *Melaleuca* (P50 and P75 combined) accounts for 17% of the region, and these two cover types dominate the central part of the region, on both sides of the Dade-Broward levee. This reflects the fact that these cover types are intermediate stages in the succession from prairie to *Melaleuca*. Very little P50 or P75 is found along the eastern edge of the Lakebelt.

Dense *Melaleuca* saplings (DMS) are concentrated in the central area of the region within a two mile radius of the Northwest Wellfield. This cover type occupies 14% of the region.

Scattered tree islands (TI) and willow heads (WH) occupy a very small proportion of the Lakebelt Region (less than 1% combined).

3.2 Man-altered cover types

Lakes (L) are predominant among the man-altered cover types, accounting for 9.4% of the Lakebelt Region. Most of the lakes are located in the eastern 1/3 of the region, both north and south of Okeechobee Road. Much of the Lake Perimeter (LP) and Disturbed (D) cover types also represent land associated with rock mining operations (the areas surrounding the lakes). These cover types account for another 7.7% of the region.

Agriculture (AG) is another important component of the man-altered cover types, accounting for 6.5% of the region. Most of the agricultural land is located at the north end of the Lakebelt Region, but a few agricultural areas are also found in the southeast corner.

The developed (DV) cover type includes institutional uses such as correctional facilities, the Northwest Wellfield, and roadways. Less than 3% of the Lakebelt Region is developed.

The FPL powerline (FPL) occupies 2.9% of the region. The remaining cover types occupy 1% of the total area or less. Other Water (OW) accounts for 1% and canals (C) account for 0.7% of the region. The disturbed prairie cover types (DP, DP50 and CP75) appear to be associated with the agricultural areas at the northern end of the Lakebelt Region. Combined, however, they only occupy slightly more than 1% of the region.

3.3 Plant species

Appendix D presents a complete list of the vascular plant species observed in the Lakebelt Region during numerous field trips over the course of the study. Next to each species is its relative abundance, its wetland status with FDEP and the Army Corps of Engineers, the habitat type in which the species is most commonly found, and its status on State and federal rare and endangered plant species lists.

Of the 307 species listed, fifteen are classified as Threatened by the State of Florida. Nine of these are ferns that are relatively widespread and common in South Florida. Six are terrestrial orchids that are also relatively common in South Florida. The

State of Florida lists all ferns and orchids in this State, regardless of their local status (Mark McMahon, 1996, pers. comm.). Two categorized as Commercially-Exploited in Florida are also relatively common in the Lakebelt Region. No federally listed plant species were observed in the Lakebelt Region, nor are any of the plants found in the Lakebelt truly endangered or threatened (Mark McMahon, 1996, pers. comm.).

3.4 Increase in *Melaleuca* cover over time - Regionwide

Changes in cover type distribution over time are shown for the entire Lakebelt Region in Figure 9 and are summarized in Tables 4 and 4a. In the 1960's, 92% of the area was prairie with less than 50% *Melaleuca*. The 1970's saw an increase in the amount of disturbed land from 5.5% to 9.5%, the beginnings of rock quarrying (up from 0.1% in the 1960's to 4.8% in the 1970's) and a reduction of tree island and prairie as *Melaleuca* now dominated almost 5% of the region. In the 1980's, disturbed land, lakes and dense *Melaleuca* continued to increase while prairie and tree islands decreased. The same progression continued throughout the 1990's, at which time *Melaleuca* dominated approximately 45% of the entire Lakebelt Region.

The increase in dense *Melaleuca* is presented graphically in Figure 10. The annual increase in cover is exponential, which is what one would expect during the early stages of population growth. A single tree dispersing its seeds outward creates a small stand of trees after a few years. If growth is unconstrained, this stand continues to grow outward from its edges as succeeding generations of trees cast their seeds outward. The rate of growth is linear if viewed in a single dimension (as in a cross section of the stand), but in terms of area, the rate is exponential. As time passes, natural obstacles to growth are encountered and the growth rate decreases. Such obstacles could include man-made barriers such as roads and canals, or simply the fact that the growing *Melaleuca* stand meets the edge of an adjacent stand and no further expansion occurs along that edge. The resulting growth curve is normally sigmoid in shape.

Laroche and Ferriter (1992) reported a three-phase, sigmoid growth pattern for *Melaleuca* studied in Dade and Broward Counties. The first phase was a log growth phase, followed by linear growth, and finally ending with a declining rate of increase. They presented a regression formula for a sigmoid curve to describe this growth:

$$\% \text{ Infestation} = 97.91 / (1 + 77.52 \times 0.74^{\text{YEAR}})$$

Due to contractual and budgetary restraints, polynomial regression was not feasible in this study. Instead, linear regressions were calculated for the data using log normal and square root transformations, as well as the untransformed data (Appendix E). As expected, the square root transformation yielded the best fit ($p = 0.016$). The regression formula and the regression curve are shown in Figure 10. Regression statistics for these data are presented in Appendix E. The r^2 value for this regression was 0.969, indicating an excellent fit.

3.5 Increase in *Melaleuca* cover over time - in eight representative sections

Figure 12 shows the changes in cover over time for each of the eight sections used for this analysis. The data are summarized in Tables 5 through 12. Figure 13 shows the increase in dense *Melaleuca* (>50% cover) over time in each section graphically. The percentages shown in Figure 13 represent the percent of the total potential *Melaleuca* habitat available in 1992 (total area minus lakes, canals and disturbed areas) as discussed in the Methods section. They therefore do not agree with the percentages presented in Tables 5a through 12a, where the acreage of each cover type is represented as a percent of the total area in each section.

Four of the sections, 5-52-40, 12-53-39, 22-52-39 and 28-53-39, show a marked increase in dense *Melaleuca* beginning as early as the late 1970's. The first two reached 50% cover by 1985. Section 28-53-39 appears to have experienced a ten year period, from 1976 to 1986, during which dense *Melaleuca* expansion was arrested. All four sections show anomalous "dips" in the graph during the 1980's, presumably due to apparent loss or redistribution of this cover type resulting from wildfires.

The remaining four sections show a lag of 15 to 20 years before dense *Melaleuca* exceeds 20% of the total available area. Two of those sections, however (4-53-39 and 5-54-39), were virtually completely covered by dense *Melaleuca* by 1992. Sections 30-52-39 and 29-53-39, both of which are west of the Dade-Broward levee, showed no appreciable dense *Melaleuca* until 1992, but the increase in *Melaleuca* coverage in 1992 is dramatic, particularly in Section 29-53-39. From 1989 to 1992, dense *Melaleuca* in this section increased from less than 1% to almost 60% cover.

Figure 14 presents the regression curves and formulas for the five sections for which significantly significant regressions could be calculated. Four of those had to be transformed before the assumption of linearity could be satisfied; one using the square root transformation and three using a natural log transformation. Regression statistics are presented in Appendix F.

The regression curves in Figure 14 fit fairly well, as indicated by the high r^2 values. Sections 30-52-39, 29-53-39 and 5-54-39 could not be fit with statistically significant regressions using either the log or square root transformations. This is most likely because of the long lag periods, followed by very rapid increases in dense *Melaleuca*.

3.6 Soil types and depths

3.6.1 Soil Type

Soil type distribution in the Lakebelt Region is presented in Figure 15, along with the locations of the soil depth stations used in this study. Those stations include ten established by the Everglades Research Group and three established by EAS Engineering.

Table 13 summarizes the acreages of each cover type found in each soil type. Lauderhill Muck is the predominant soil type, occupying 57.6% of the study area. All of the muck soils, combined, account for 84% of the total study area. Urban soils

(Udorthents) occupy less than 5% of the study area.

Soil distribution shows very distinct patterns. Most of the Dania Muck, for example, occupies the area north of Okeechobee Road, and most of the Pahokee Muck is found in a large, rectangular area west of the Dade-Broward levee. The three marl soils (Biscayne Marl, Biscayne Marl-Rock Outcrop Complex and Perrine Marl) are all located in the southeast corner of the region, although small marl pockets (less than ½ acre) were noted at some of the Everglades Research Group's wildlife stations in the northern part of the Lakebelt Region (Mark McMahon, 1996, pers. comm.). The udorthents are all concentrated around the rock quarries. Note that Demroy Muck was excluded from Figure 15 because this map unit was too small to be visible at this scale.

Table 13a presents the percentage of each cover type occupying each soil type. The muck soils, which constitute about 84% of the entire Lakebelt Region, contain almost all of the *Melaleuca*. To test whether there is any relationship between soil type and cover type distribution, it was necessary to factor out the large differences in area occupied by the different soils. If distribution is random, then the area of any cover type occupying a given soil type should be proportional to the total area occupied by that soil type. To test this, the acreage of each cover type occupying each soil type was regressed against the acreages of the soil types. The results yielded very significant positive regression ($p < 0.01$) for all cover types (Appendix G). The r^2 value for dense *Melaleuca* (M) was 0.976. This indicates that the acreage of dense *Melaleuca* occupying the different soil types is a function of the relative abundance of that soil type.

3.6.2 Soil Depth

Soil depth data collected for this study are shown in Table 14. Additional data from other studies, which could not be included in this analysis because of inconsistencies in cover type classification systems, are presented in Appendix H.. Figure 16 is a "whisker" graph showing the range of soil depths for each of the six cover types where soil depth was measured. For each cover type, the median value for soil depth is represented by the center horizontal line (DM is an exception because there were only five measurements). The median splits the ordered sample population in half, and the "hinges" (the boxes above and below the median) split the remaining halves in half again. The "whiskers", or vertical lines above and below the boxes, indicate the range of values falling within 1.5 "Hspreads" of the "hinges". "Hspread" is the difference between the values of the two "hinges". The circle for DM indicates a value far outside the other values. Soil depths in all cover types ranged from 22 to 132 cm.

Analysis of variance revealed significant differences among the soil depths in different cover types. A Tukey pairwise comparison revealed that soils in the dense *Melaleuca* sapling (DMS) cover type are significantly shallower than in any of the other cover types. Dense *Melaleuca* (DM) and prairie (P) soils are significantly different from all other soil types, but not significantly different from each other, with an intermediate depth. The deepest soils are found in tree islands (TI) and in prairie with *Melaleuca* (P50 and P75). The statistical analyses are included in Appendix H.

One limitation of the soil depth analysis is that the soil depth stations are clustered in a small area of the Lakebelt Region rather than randomly distributed. Figure 15 shows that all of the Everglades Research Group's stations were clustered at the north end of the study area, with two of the stations (DMS-1 and DM-2) located in Dania Muck and the rest of them in Lauderhill Muck. The prairie stations (P) were all located west of the Dade-Broward levee, while the P50 and P75 stations, except for P50-1, were all east of the levee. The differences between the soil depths in the various cover types therefore might reflect local conditions or the type of soil, rather than the cover type in which the depths were measured. Nevertheless, the fact that DMS soils are shallower than any of the other soils is consistent with the belief that this cover type represents *Melaleuca* resurgence in the wake of wildfires. One would expect shallow soils in areas that had been burned.

3.7 Topography

Lake Belt topography is presented in Figure 17, with the areas between contour lines shaded. Two limitations are apparent in this figure. First, there are no data for the area north of Okeechobee Road, and second, the four foot contour is not complete, so the 3'-4' and 4'-5' ranges had to be combined. The contours show a north-south orientation, and elevations show an east-west gradient, with the land gently sloping up from the Florida Turnpike westward toward Krome Avenue. The area west of the Dade-Broward levee is higher than the land to the east of the levee. There is also a depression in the vicinity of the Northwest Wellfield, where the lowest elevations are found (2' or less).

Tables 14 and 14a show the distribution of the different cover types on the four elevation ranges. The same approach was used to relate cover type to elevation as was described above for soil type, namely, to determine what proportion of the variance can be accounted for by the relative size of the different elevation ranges. Dense *Melaleuca* (M) acreage, when regressed against elevation acreage, yielding a very significant ($p < 0.01$) positive slope, with an r^2 value of 0.971, indicating that the amount of dense *Melaleuca* at any particular elevation range is proportional to the acreage of that elevation range.. This can be seen in Table 14a, which shows that 70% of the dense *Melaleuca* occurs at the 3 to 5 foot elevation range, which accounts for 61% of the Lakebelt Region. The same was true for developed areas (D), canals (C), and tree islands (TI), although D was just barely significant ($p = 0.049$; $r^2 = 0.775$).

ML50, however, reveals a significantly disproportionate relationship with elevation, i.e. there is much more ML50 at the 5 to 6 foot elevation range and much less at the 3 to 5 foot range than would be expected based on size alone. This reflects the fact that most of the ML50 (79%) is found west of the Dade Broward Levee, which is at the 5 to 6 foot elevation range, which only accounts for 37% of the Lakebelt Region. Similarly, Lake (L) distribution is skewed toward the lower elevations in the eastern part of the study area; 91% of the lake area is found in the 3 to 5 foot range, even though it accounts for only 61% of the total Lakebelt Region, and 8% is in the 2 to 3 foot range, which only occupies 2% of the region.

3.8 Hydrology

Average, annual groundwater elevations for each of the six wells selected for this study, for the period 1963 to 1992, are presented in Table 15 and shown graphically in Figure 18. Well locations are shown in Figure 7. Regression analysis was performed on the annual mean groundwater elevation data for each well (elevation vs. time; Appendix J). Only three of the six wells yielded significant slopes: G-974, G-975 and G-976. All three slopes were negative, on the order of 1/10 of a foot drop per year. These three wells are the closest to the Northwest Wellfield, so it is tempting to conclude that the negative slopes reflect drawdown by the wellfield. The wellfield, however, did not start pumping until the early 1980's, yet the downward trend in groundwater elevation in these three wells appears to have begun before that time. To test this, the regressions for these three wells were re-computed using only the 1963 - 1980 data (Figure 19). Well G-974 had a highly significant negative slope ($p=0.0028$); Well G-976 had an almost significant negative slope ($p = 0.0508$); and Well G-975's slope was not significantly different from zero. The significance of at least one of the negative slopes in the early years before the wellfield began operating would appear to rule out pumping alone as a cause of the drop in groundwater levels.

A Pearson correlation analysis compared dense *Melaleuca* cover in six of the eight sections used to measure *Melaleuca* expansion rates with groundwater elevations for the corresponding years at the corresponding wells (See Figure 7). No significant correlation was found for any of the six comparisons. Correlation statistics are presented in Appendix J.

Average monthly groundwater elevations were calculated for the six wells for the last twelve years of the study period, i.e. 1980 through 1992 (Table 17). Figure 19 presents the data graphically. The highest groundwater elevations occurred in Well G-1488, followed in order of decreasing water level by G-975, G-972 and G-976. Wells G-970 and G-974 had similar groundwater elevations for most of this period. This pattern suggests an east-west gradient, with higher groundwater elevations in the west and lower elevations in the east.

Ground elevations at five of the six wells were estimated by superimposing Figure 7 (Well Locations) over Figure 17 (Topography). No topographic information is available in the vicinity of Well G-970. When plotted against groundwater elevation (Figure 20), the ground elevation provides an estimate of hydroperiod in the vicinity of the five wells, i.e. the number of consecutive months in which groundwater elevation is equal to, or greater than the ground elevation. The results reveal the following hydroperiods:

	Hydroperiod
Well G-972	1 month (Sept.)
Well G-974	4 months (Aug.-Nov.)
Well G-975	2 months (Sept. - Oct.)
Well G-976	1 month (Oct.)
Well G-1488	8 months (Aug. - Mar.)

These hydroperiods do not exhibit the same east-west gradient evident in the groundwater elevation data. This is because the topography follows the same gradient. Although it is widely believed that the Pennsuco Basin is wetter than areas east of the Dade-Broward levee (McMahon, 1996, pers. comm.), these data do not fully support that assumption. Well G-1488, which is in the Pennsuco Basin, has a markedly longer hydroperiod than any other well, but well G-975, which also is in the basin, appears to have a lower hydroperiod than Well G-974, which is east of the Dade-Broward Levee.

4.0 Discussion

4.1 *Melaleuca* expansion

Melaleuca has expanded exponentially from 1963 to 1992, at which time it occupied nearly 45% of the Lakebelt Region. Most of this expansion occurred at the expense of ML50, given that: a) ML50 decreased by 32,000 acres during the same period that dense *Melaleuca* increased by 21,000 acres, b) Tree Island, the only other cover type that decreased in size during the same period, was a very small component of the study area in terms of acreage (762 acres in 1963), and c) all other cover types increased due to human activity (Lakes and Disturbed) or remained unchanged (Canal). This is to be expected, since ML50 is only a transitional phase in the succession from prairie to dense *Melaleuca*.

When the eight sections selected were examined, it became obvious that *Melaleuca* is not invading uniformly throughout the region. Six of the sections (5-52-40, 22-52-39, 12-53-39, 28-53-39, 5-54-39 and 4-53-39) are already almost completely covered with dense *Melaleuca,* while the remaining two sections (30-52-39 and 29-53-39) had almost no dense *Melaleuca* until 1989. Once *Melaleuca* foci appear in prairie habitat, expansion is very rapid. The time required for *Melaleuca* to completely overcome a square mile section once the first foci appear is approximately twenty years. Our results agree with Laroche & Ferriter's (1992) conclusion that it takes 25 years to go from 2-5% cover to 95% cover.

The appearance of *Melaleuca* appears to have been delayed by 15 to 20 years in some sections, namely, Sections 05-54-39, 30-52-39 and 29-53-39 (Fig. 13) for reasons that could not be determined. The only factor these sections appear to have in common is that they are all west of the Dade-Broward levee. Once the infection appeared, however, the rate of expansion was dramatic. In Section 29-53-39, for example, dense *Melaleuca* increased from almost nothing in 1989 to cover more than half the section in a period of only three years. In Section 5-54-39, dense *Melaleuca* increased from 18% to 97% during the same three year period.

The sigmoid growth curve reported for this region by Laroche and Ferriter (1992) was clearly evident in only one of the eight sections examined, Section 12-53-39. The other sections that had attained 80% or more cover by 1992 (5-52-40, 22-52-39, 4-53-39, 28-53-39 and 5-54-39) showed no sign of the decreased expansion rate at the upper end of the curve. They appear to have gone through an exponential increase in the early years and then proceeded straight to ±90% cover.

4.2 Soil-cover type relationships

The amount of any given cover type on the various soil types was shown to be a function of the relative amount of that soil type in the Lakebelt Region, suggesting a random distribution with no particular relationship between soil type and cover type.

Soil depths show significant differences that may be related to cover type (Figure 16), but the meaning of these differences is unclear. If soil depth and *Melaleuca* cover were related, one would expect P50 and P75 to have an intermediate soil depth, somewhere between that of prairie (P) and dense *Melaleuca* (DM), because they are transitional stages in the succession from prairie to dense *Melaleuca*, Yet the soil depths in P50 and P75 were significantly greater than those in either prairie or dense *Melaleuca*, and there was no significant difference between soil depths in prairie and dense *Melaleuca*.

4.3 Topography-cover type relationships

No correlation was found between topography and the distribution of *Melaleuca*; the acreage of *Melaleuca* at any given elevation is proportional to the acreage of the Lakebelt Region at that elevation. ML50 shows a disproportionate presence on the higher elevations (5'-6') and D and L show a disproportionate presence at the lower elevations (3'-5'), but these most likely are due to the fact that topography exhibits an east-west gradient, so what appears to be a topographic correlation may simply be a geographic function (i.e. distance from the urban fringe).

4.4 Hydrology-cover type correlation

Melaleuca increased in extent in all six of the sections represented by the six wells during the period 1963-1992. There was no signficant change in groundwater elevation in three of the wells, and a significant decrease in groundwater elevation in the other three over this same period of time. No significant correlation could be found between *Melaleuca* expansion and groundwater level.

The section with the greatest hydroperiod (29-53-39), an eight month hydroperiod indicated by the corresponding well (G-1488), was the last section to experience serious invasion by *Melaleuca*. It was not until 1992 that this section had more than 1% cover of dense *Melaleuca*. Inundation alone cannot explain this phenomenon, however, because the section with the next longest hydroperiod (12-53-39), with a four month hydroperiod indicated by the corresponding well (G-974), had over 50% dense *Melaleuca* cover by

1976, sixteen years earlier. Three drier sections (28-53-39, 30-52-39 and 22-52-39) had only 21%, 6%, and 19% dense *Melaleuca* in 1976, respectively. This is further evidence that the *Melaleuca* invasion rate is not affected by inundation.

4.5 East-West Progression

Another way to examine the data is to rank the eight sections by the year they first attained 50% cover by dense *Melaleuca:*

Rank	Section	Year 50% cover attained	Miles from Fla. Turnpike to Center of Section
1	Section 12-53-39	1976	0.5
2	Section 05-52-40	1984	0.5
3	Section 04-53-39	1989	3.5
T	Section 22-52-39	1992	2.5
T	Section 28-53-39	1992	3.5
T	Section 29-53-39	1992	4.5
T	Section 05-54-39	1992	4.5
8	Section 30-52-39	Not attained as of 1992	5.5

T indicates ties.

This ranking suggests an east-west gradient in certain portions of the Lakebelt. The two sections ranked highest (1 and 2) are adjacent to the Florida Turnpike on the eastern edge of the study area. The third-ranked section and the following four ties are in the central region of the Lakebelt, and the last-ranked section is adjacent to Krome Avenue on the western edge of the study area.

The presence of an east-west gradient in the timing of *Melaleuca* invasion suggests that the existence of a seed source in adjacent areas may be the dominant factor affecting the spread of this species. It is also consistent with a downwind progression, which would be expected for a wind-dispersed seed, since the prevailing winds are from the southeast. Statistical analyses were not performed relating *Melaleuca* expansion to direct physical disturbance of the land surface, such as mowing and/or grazing. Similarly, indirect physical disturbance, such as would be caused by construction, changing the way a canal is operated, and drainage, also was not considered.

5.0 Conclusion

Dense stands of *Melaleuca* presently occupy 44% of the Lakebelt Region. In portions of the Lakebelt Region, *Melaleuca* is apparently spreading rapidly in a westerly direction. No correlations were found between *Melaleuca* growth rate and topography, soil type or hydroperiod. Our data show that there may be an affinity for shallow soils, but a cause-effect relationship cannot be drawn from these limited data. Wildfires slow down its progress for a short time, but *Melaleuca* returns within a few years as dense stands of saplings which will inevitably become dense *Melaleuca* forest.

6.0 Recommendations for Future Study

This study was somewhat limited in scope because of budgetary constraints. Photointerpretation, digitization and GIS analysis are very labor-intensive and expensive. Our analysis focused on the mapping and inventory aspects of the Lakebelt Study, with limited statistical analysis. All of the raw data, however, are presented in the appendices so that others can continue to analyze the data using more sophisticated techniques. More thorough analysis of the same data, using more sophisticated analyses, might provide additional insight into the factors that determine how *Melaleuca* is dispersed and how fast it spreads.

The analysis presented in this report should be updated periodically using more recent aerial photography. Analysis of the 1996 aerials now available would add another point to each of the graphs of *Melaleuca* expansion, and would help clarify the shapes of the curves.

We also recommend that future studies divide the Lakebelt into subregions. Based on the results of this study, the Lakebelt Study Area appears to consist of a series of distinctive subregions with different physical characteristics and vegetative associations. Regional analysis might be more useful from a planning point of view than the regionwide approach used in this study.

Acknowledgements

We would like to express our gratitude to Dr. Steven Green of the University of Miami for his assistance with the statistical analyses and to Mr. Scott Prinos of the U.S. Geological Survey for providing the wellfied data summaries.

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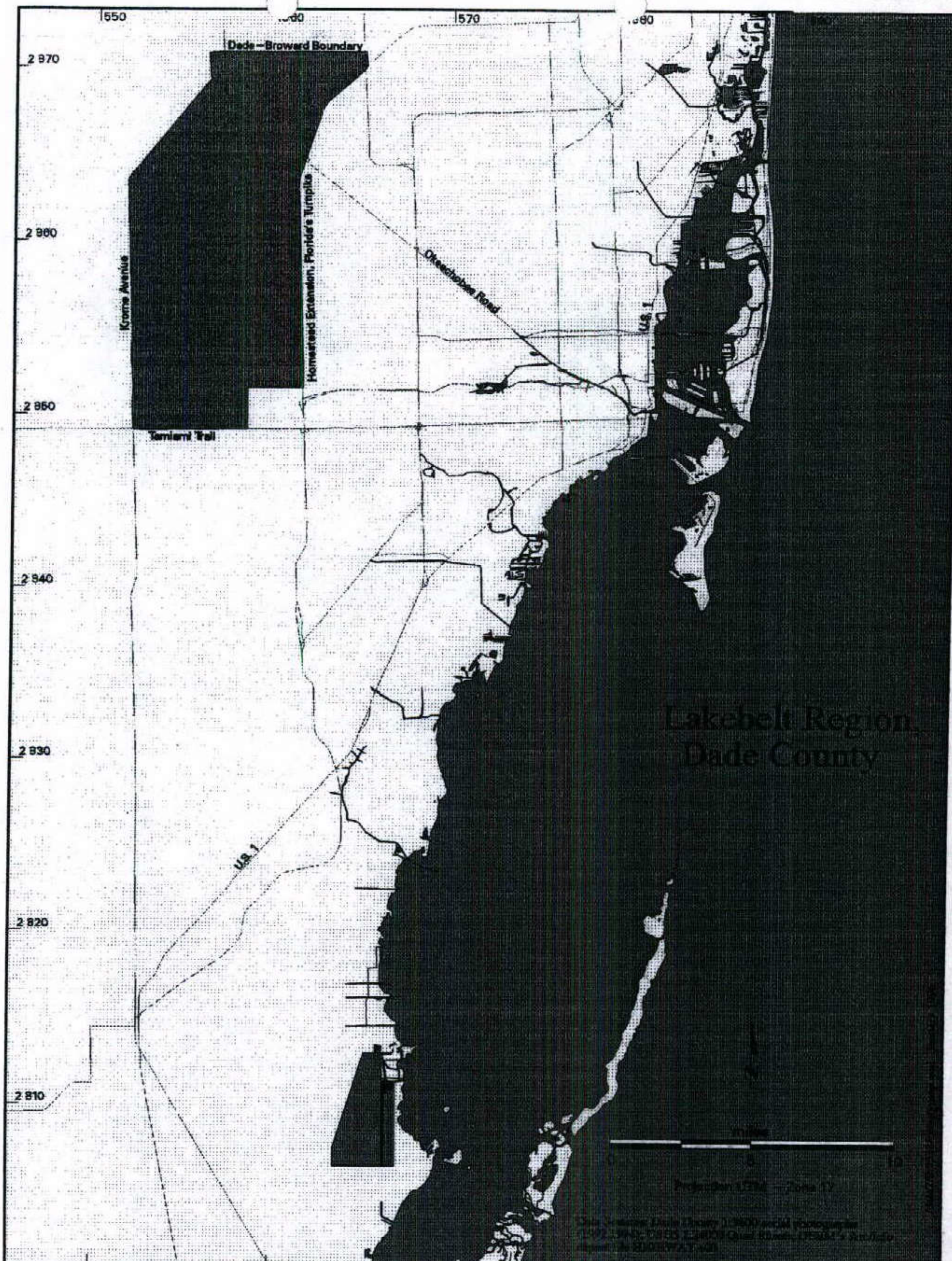
FIGURES

FIGURE #1



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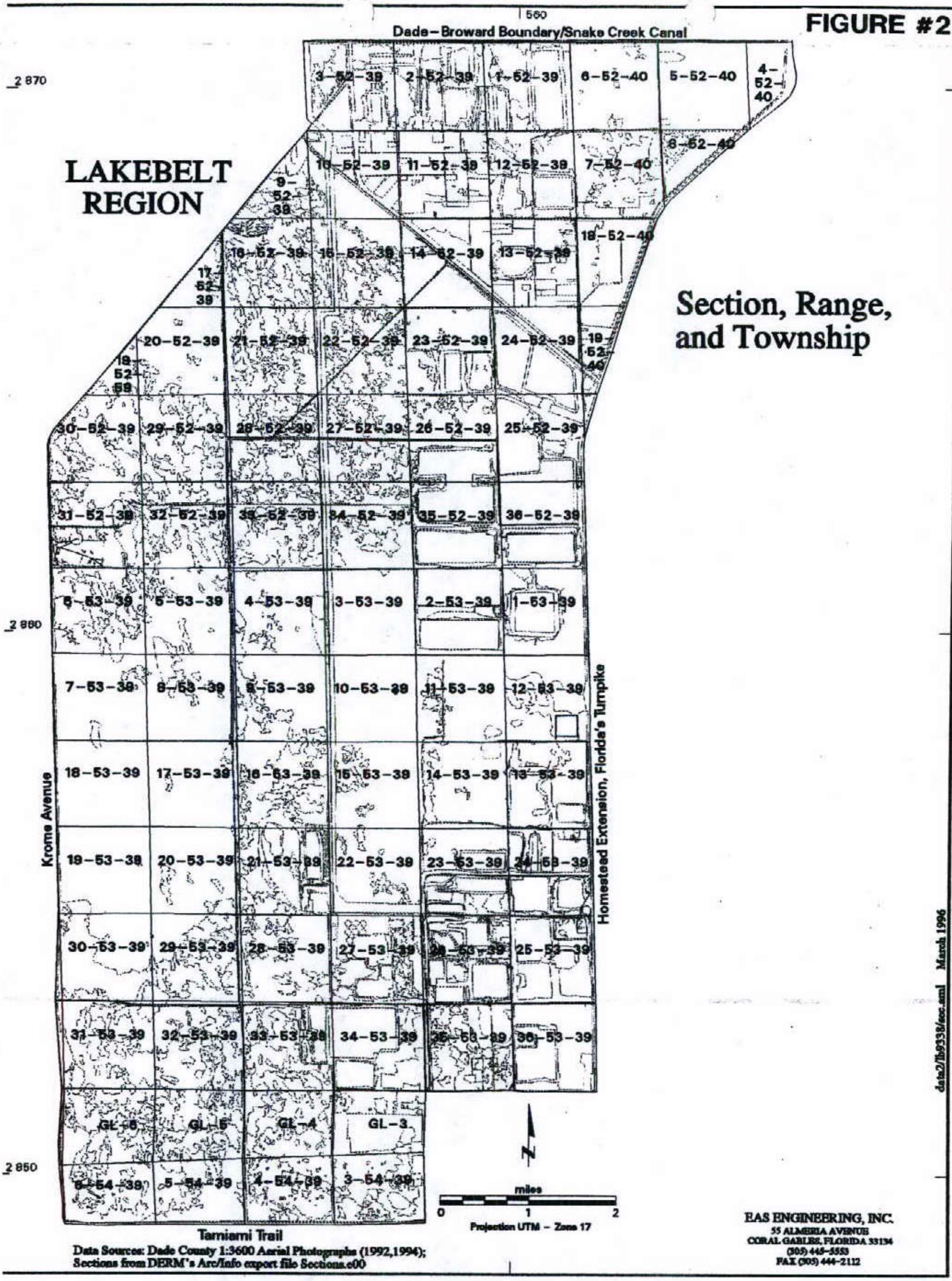
FIGURE #2
Dade–Broward Boundary/Snake Creek Canal
LAKEBELT REGION
Section, Range, and Township
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
miles
0 1 2
Projection UTM – Zone 17
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994); Sections from DERM's Arc/Info export file Sections.e00
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FAX (305) 444-2112
March 1996

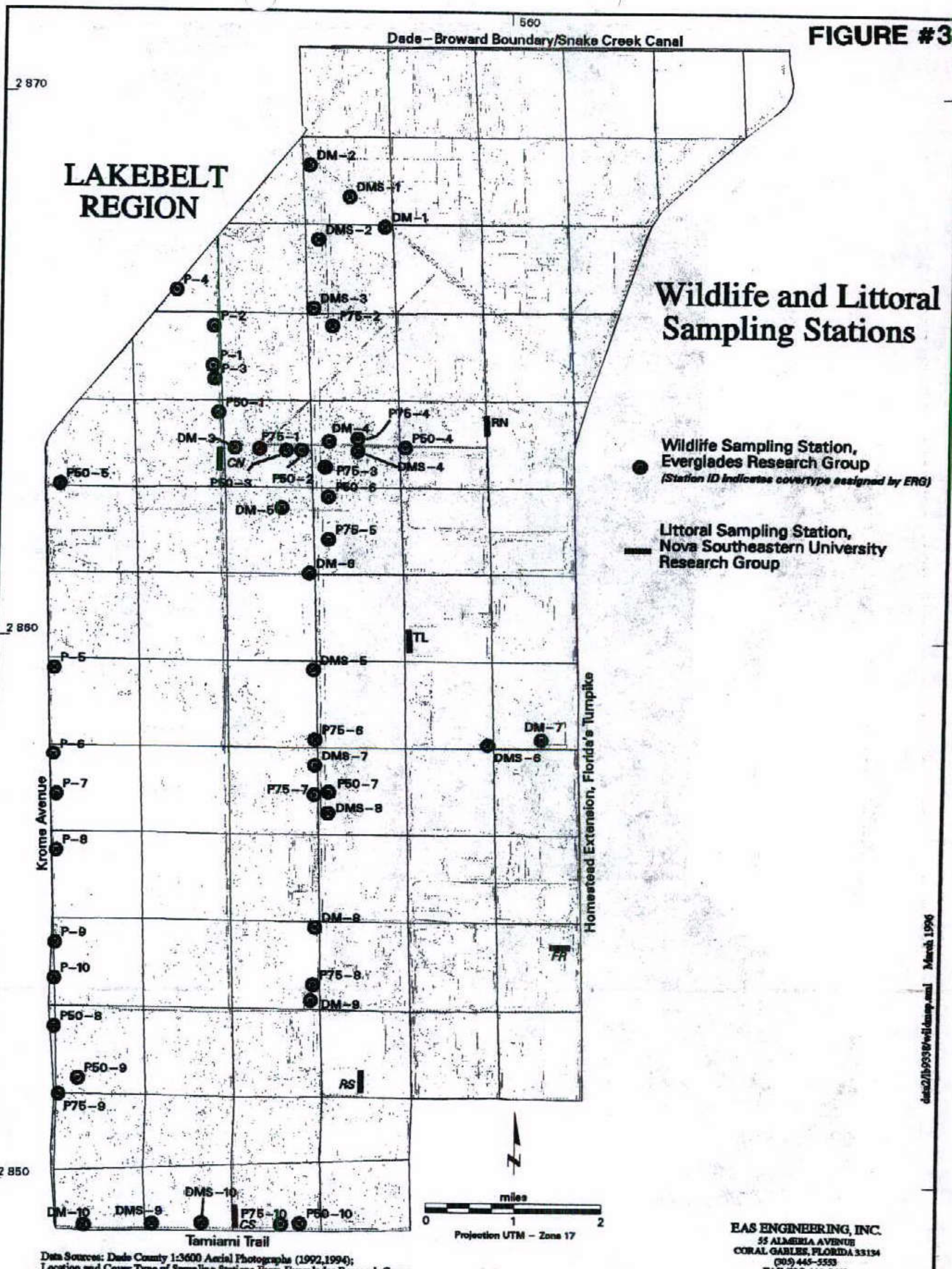
FIGURE #3
Wildlife and Littoral Sampling Stations
LAKEBELT REGION
Dade–Broward Boundary/Snake Creek Canal
560
2 870
2 860
2 850
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
DM-2
DMS-1
DM-1
DMS-2
P-4
DMS-3
P75-2
P-2
P-1
P-3
P50-1
P75-4
DM-4
P50-4
RN
DM-3
P75-1
CN
DMS-4
P75-3
P50-5
P50-3
P50-2
P50-6
DM-5
P75-5
DM-6
TL
P-5
DMS-5
P75-6
DM-7
P-6
DMS-7
DMS-6
P-7
P75-7
P50-7
DMS-8
P-8
DM-8
P-9
FR
P-10
P75-8
DM-9
P50-8
P50-9
RS
P75-9
DMS-10
DM-10
DMS-9
P75-10
CS
P50-10
Wildlife Sampling Station, Everglades Research Group
(Station ID indicates covertype assigned by ERG)
Littoral Sampling Station, Nova Southeastern University Research Group
miles
0
1
2
Projection UTM – Zone 17
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994);
Location and Cover Type of Sampling Stations From Everglades Research Group
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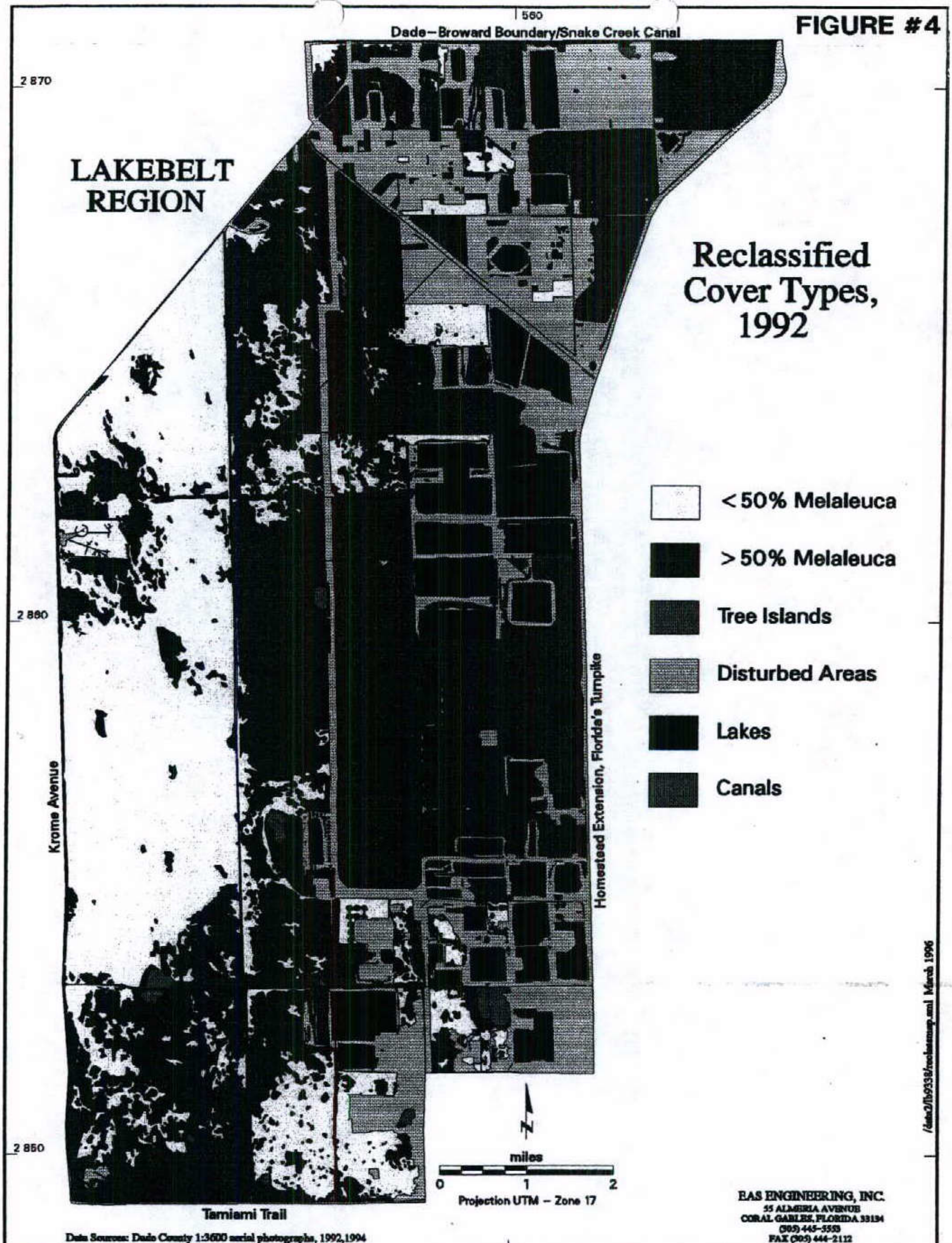
FIGURE #4
560
Dade–Broward Boundary/Snake Creek Canal
2 870
LAKEBELT REGION
Reclassified Cover Types, 1992
<50% Melaleuca
>50% Melaleuca
Tree Islands
Disturbed Areas
Lakes
Canals
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0 1 2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 aerial photographs, 1992,1994
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Cover Types, 1992, with Melaleuca Classified at 50% and 75% Levels

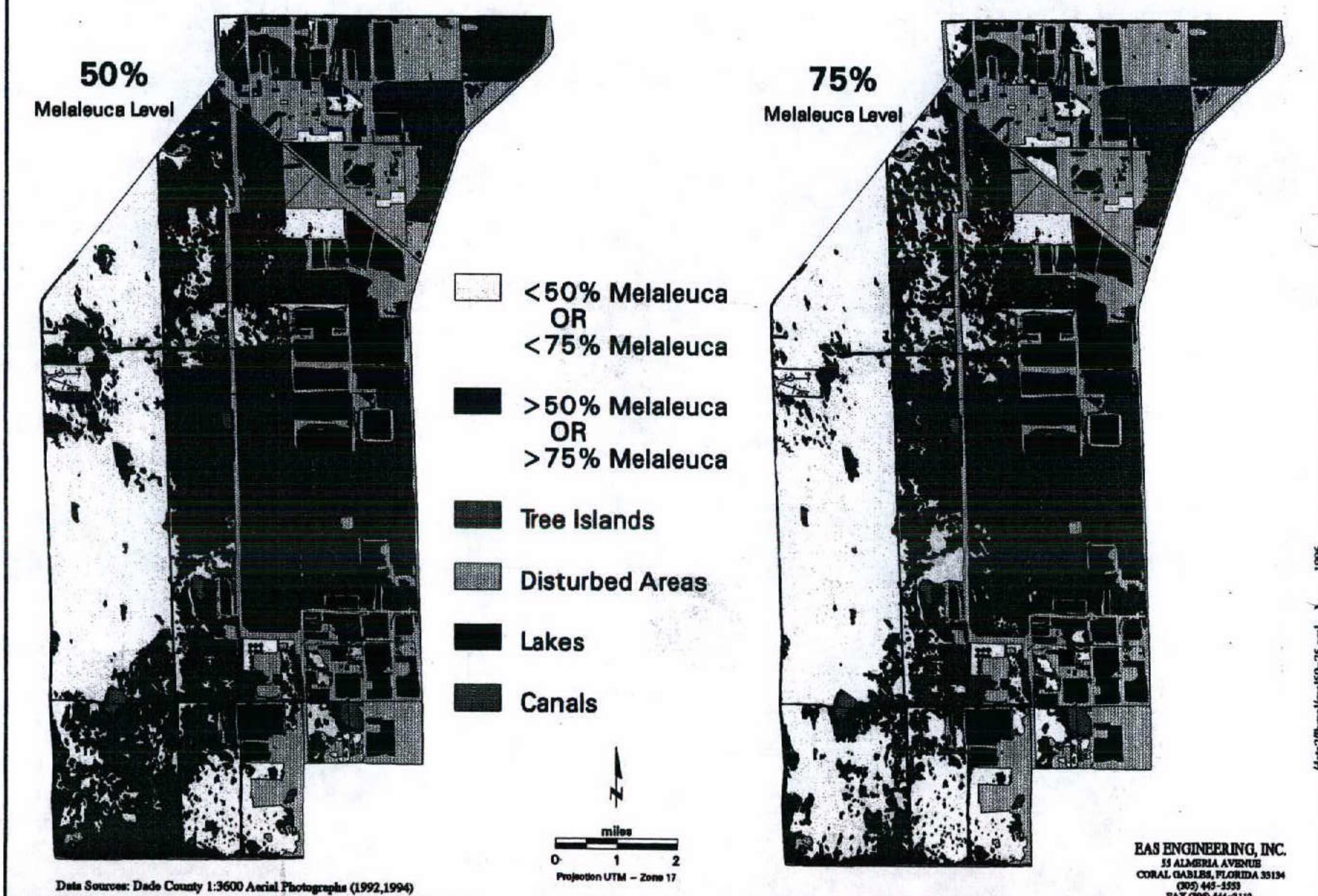
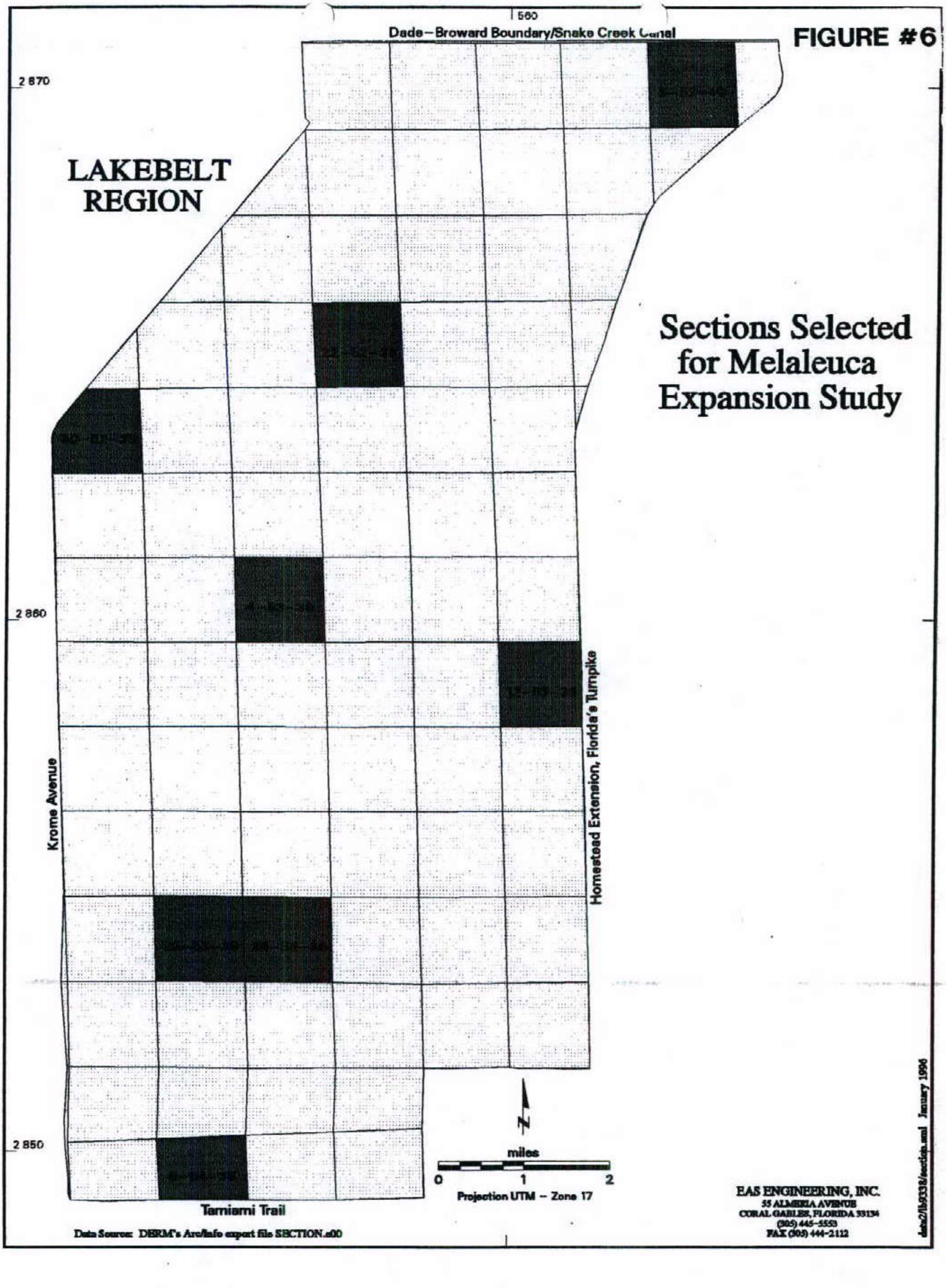


FIGURE #5



560
Dade–Broward Boundary/Snake Creek Canal
FIGURE #6
2 870
LAKEBELT REGION
Sections Selected for Melaleuca Expansion Study
2 860
Homestead Extension, Florida's Turnpike
Krome Avenue
2 850
miles
0 1 2
Projection UTM – Zone 17
Tamiami Trail
Data Source: DERM's Arc/Info export file SECTION.e00
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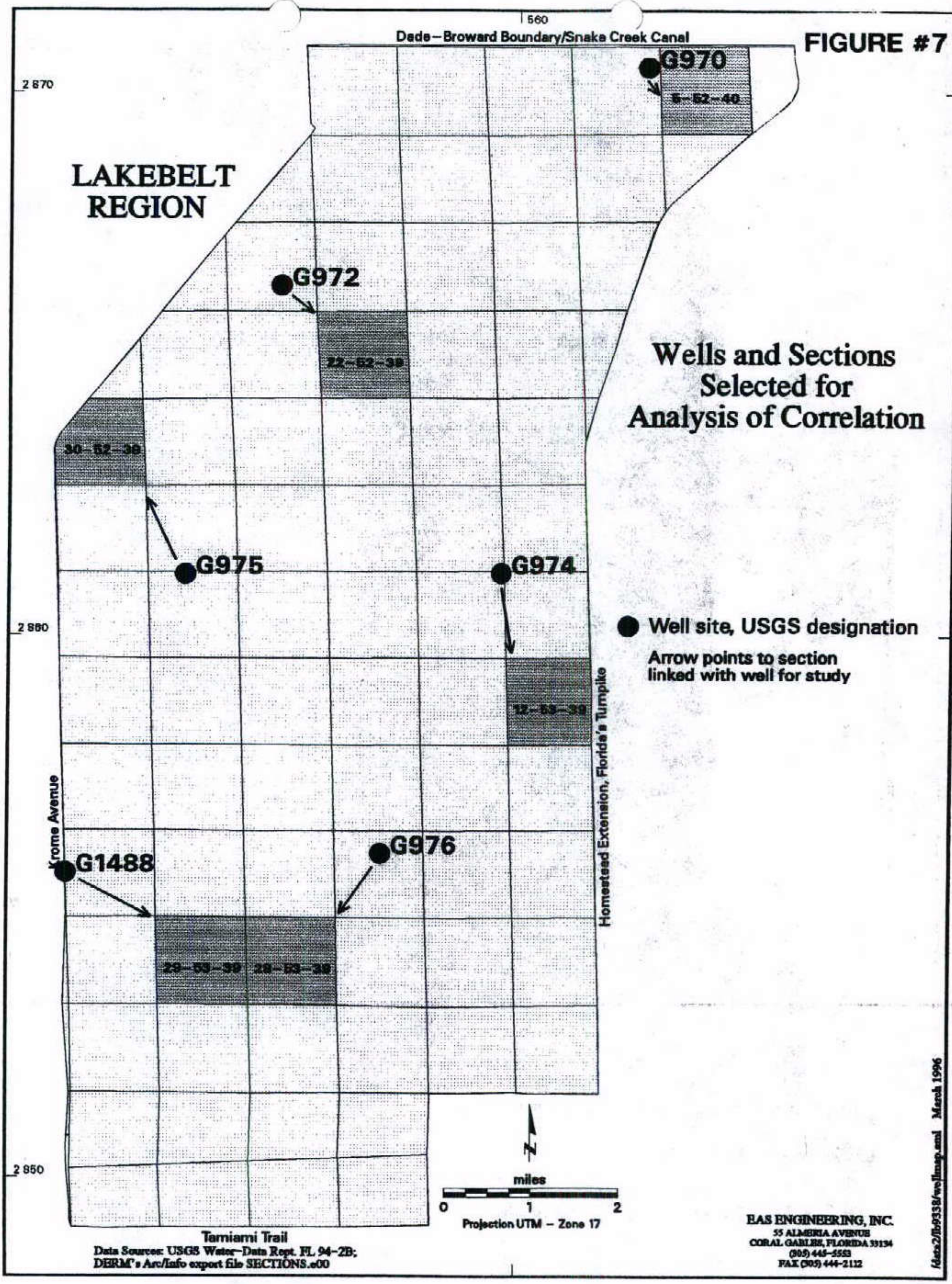

FIGURE #7
Wells and Sections Selected for Analysis of Correlation
LAKEBELT REGION
Dade–Broward Boundary/Snake Creek Canal
560
2 870
2 860
2 850
G970
G972
G975
G974
G976
G1488
22-52-39
30-52-39
12-53-39
29-53-39
28-53-39
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
Well site, USGS designation
Arrow points to section linked with well for study
miles
0 1 2
Projection UTM – Zone 17
Data Sources: USGS Water-Data Rept. FL 94-2B; DERM's Arc/Info export file SECTIONS.e00
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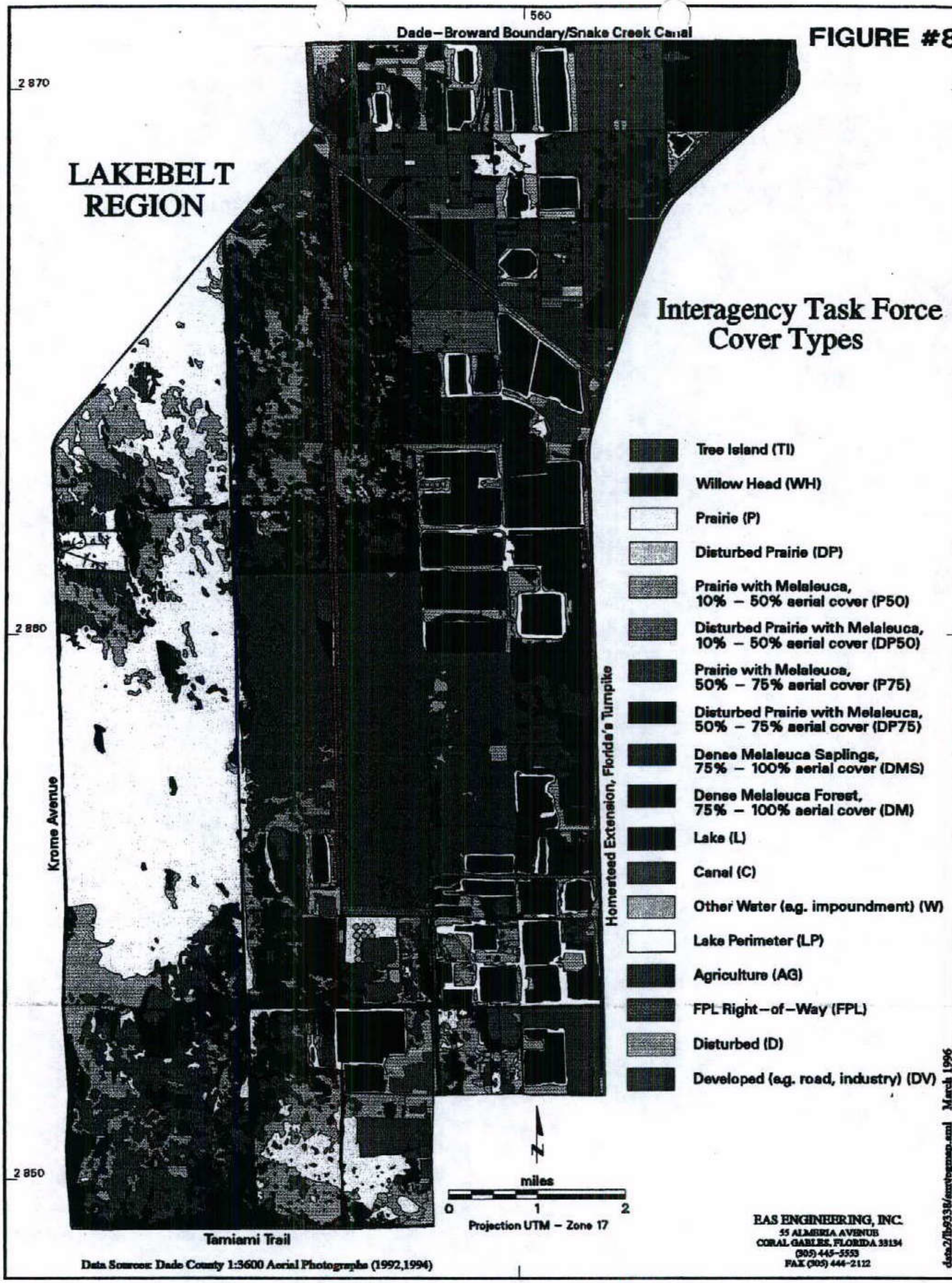
FIGURE #8
560
Dade-Broward Boundary/Snake Creek Canal
2 870
LAKEBELT REGION
Interagency Task Force Cover Types
Tree Island (TI)
Willow Head (WH)
Prairie (P)
Disturbed Prairie (DP)
Prairie with Melaleuca, 10% - 50% aerial cover (P50)
Disturbed Prairie with Melaleuca, 10% - 50% aerial cover (DP50)
Prairie with Melaleuca, 50% - 75% aerial cover (P75)
Disturbed Prairie with Melaleuca, 50% - 75% aerial cover (DP75)
Dense Melaleuca Saplings, 75% - 100% aerial cover (DMS)
Dense Melaleuca Forest, 75% - 100% aerial cover (DM)
Lake (L)
Canal (C)
Other Water (e.g. impoundment) (W)
Lake Perimeter (LP)
Agriculture (AG)
FPL Right-of-Way (FPL)
Disturbed (D)
Developed (e.g. road, industry) (DV)
2 860
Homestead Extension, Florida's Turnpike
Krome Avenue
2 850
miles
0 1 2
Projection UTM - Zone 17
Tamiami Trail
Data Source: Dade County 1:3600 Aerial Photographs (1992,1994)
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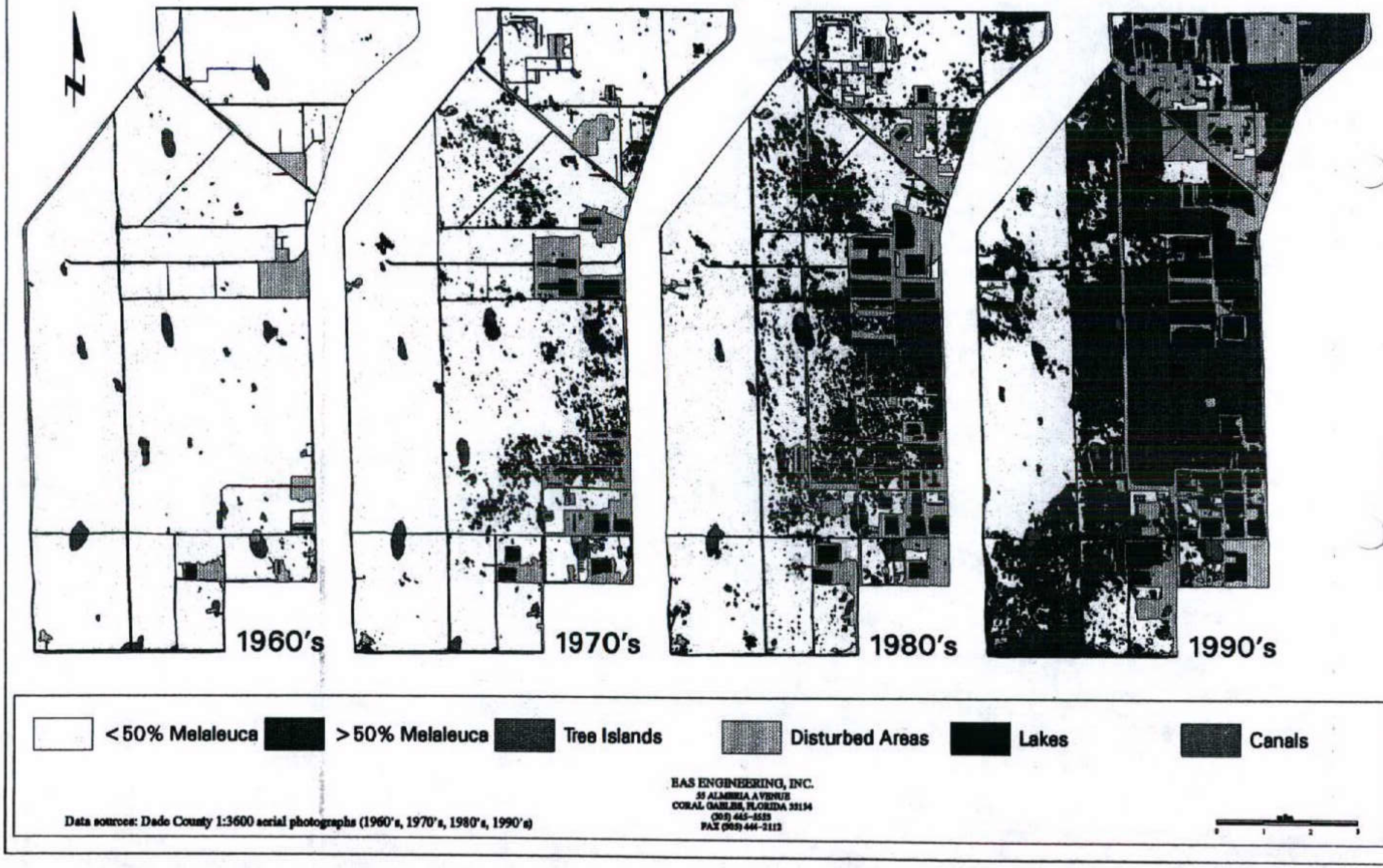
DOC#614

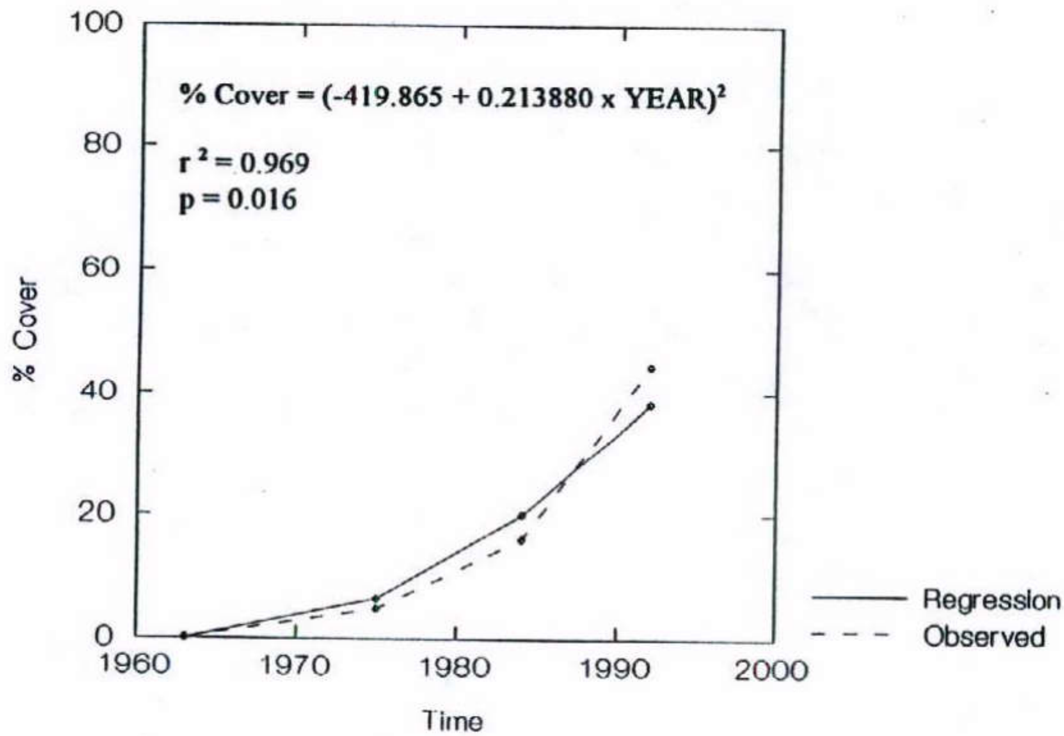
Melaleuca Expansion, 1963–1993, Lakebelt Region



Data sources: Dade County 1:3600 aerial photographs (1960's, 1970's, 1980's, 1990's)

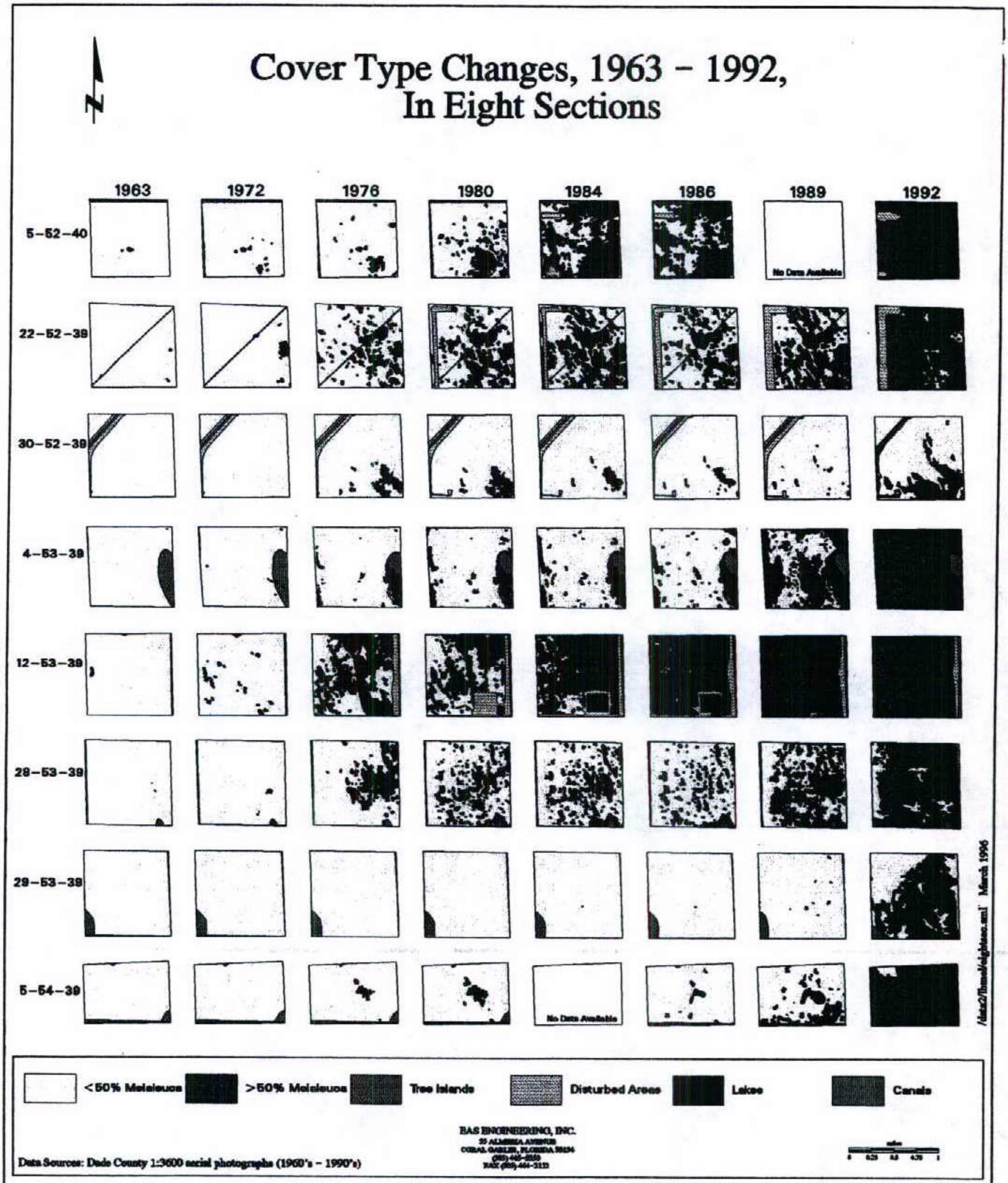
FIGURE #9

Melaleuca Expansion: Entire Lakebelt Region



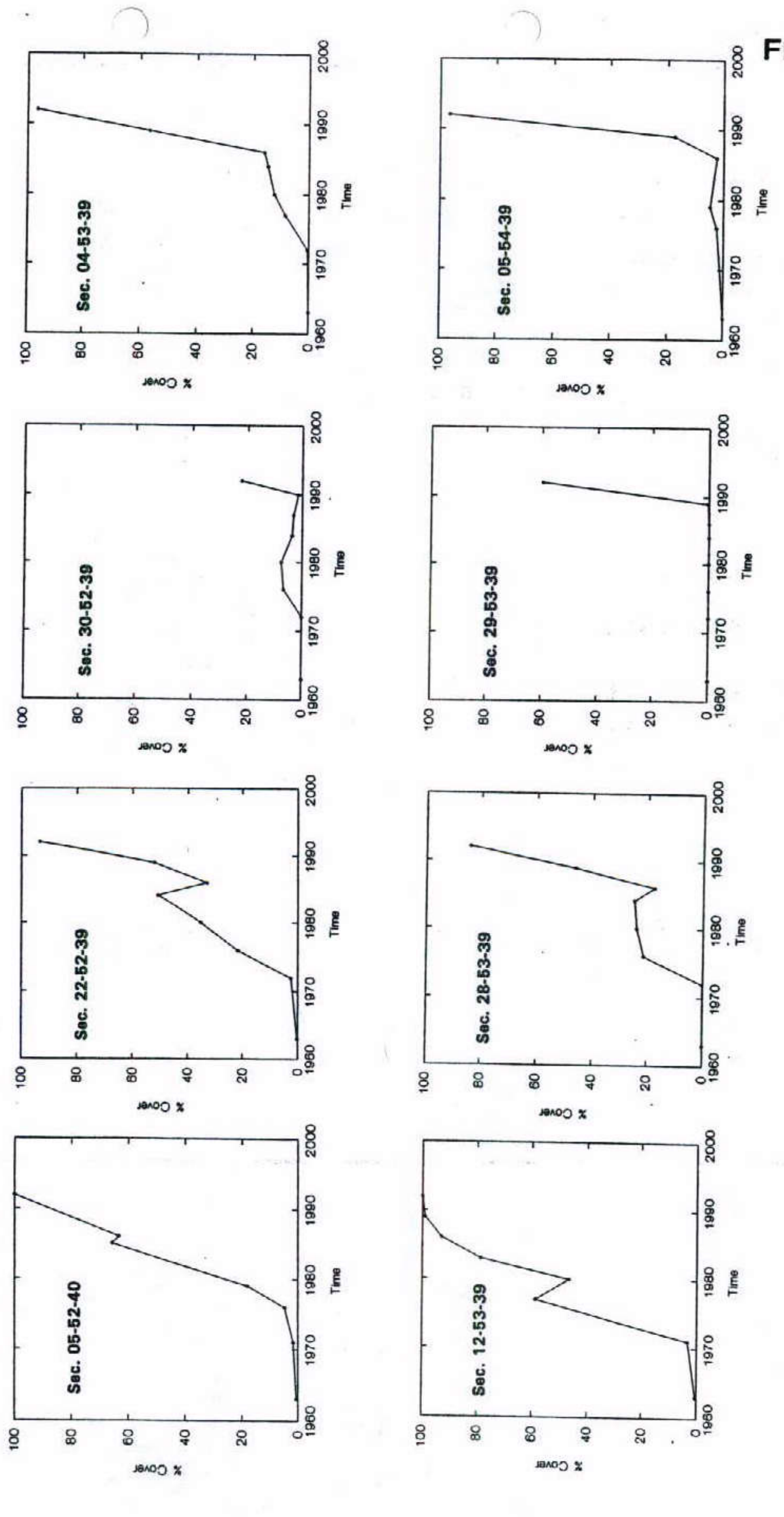
THIS FIGURE NOT USED.

FIGURE #12



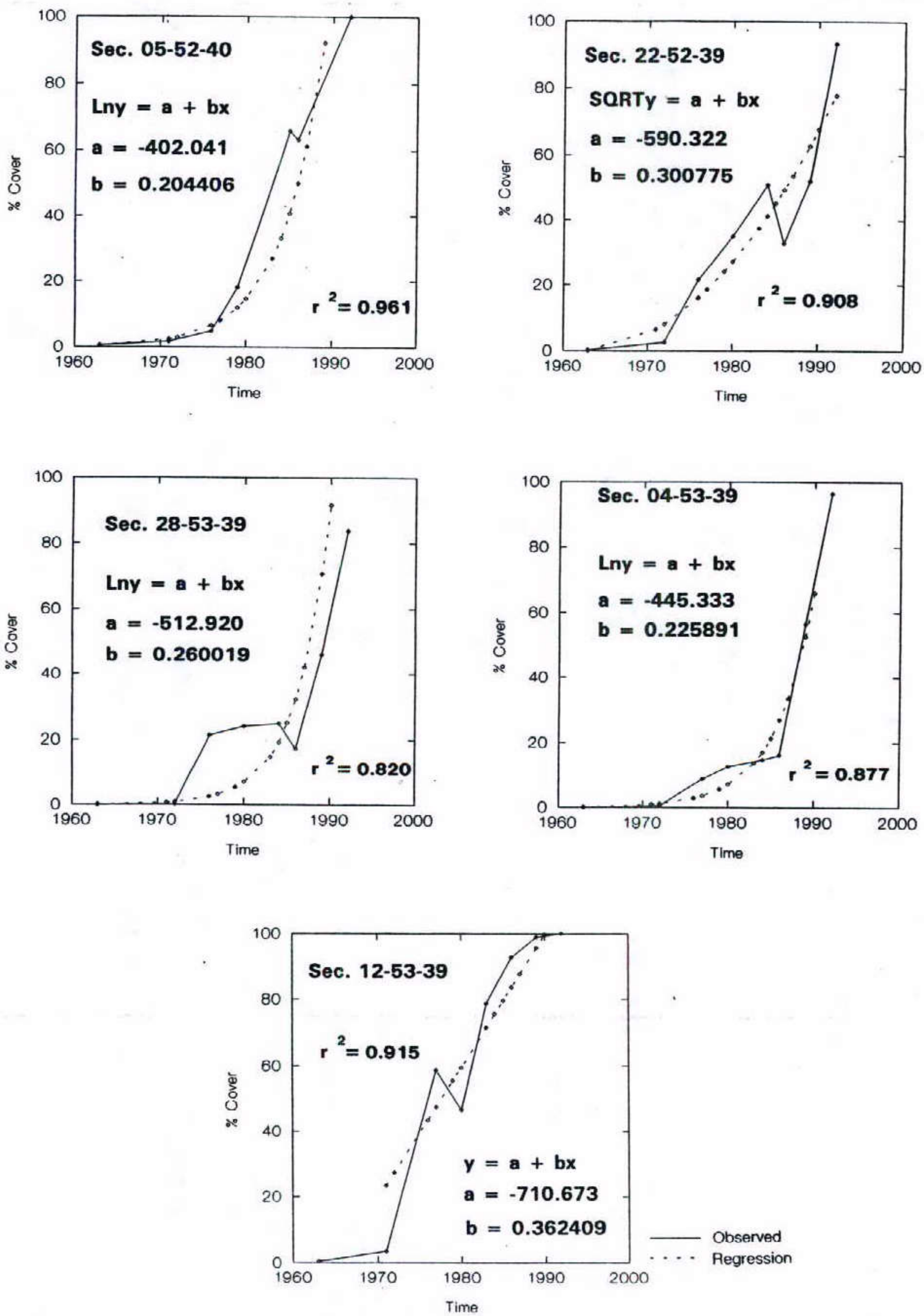
DOC#614

FIGURE #1



Sec. 04-53-39
Sec. 05-54-39
Sec. 30-52-39
Sec. 29-53-39
Sec. 22-52-39
Sec. 28-53-39
Sec. 05-52-40
Sec. 12-53-39
% Cover
Time

FIGURE #14


Sec. 05-52-40
Lny = a + bx
a = -402.041
b = 0.204406
r 2 = 0.961
% Cover
Time
Sec. 22-52-39
SQRTy = a + bx
a = -590.322
b = 0.300775
r 2 = 0.908
% Cover
Time
Sec. 28-53-39
Lny = a + bx
a = -512.920
b = 0.260019
r 2 = 0.820
% Cover
Time
Sec. 04-53-39
Lny = a + bx
a = -445.333
b = 0.225891
r 2 = 0.877
% Cover
Time
Sec. 12-53-39
r 2 = 0.915
y = a + bx
a = -710.673
b = 0.362409
% Cover
Time
Observed
Regression

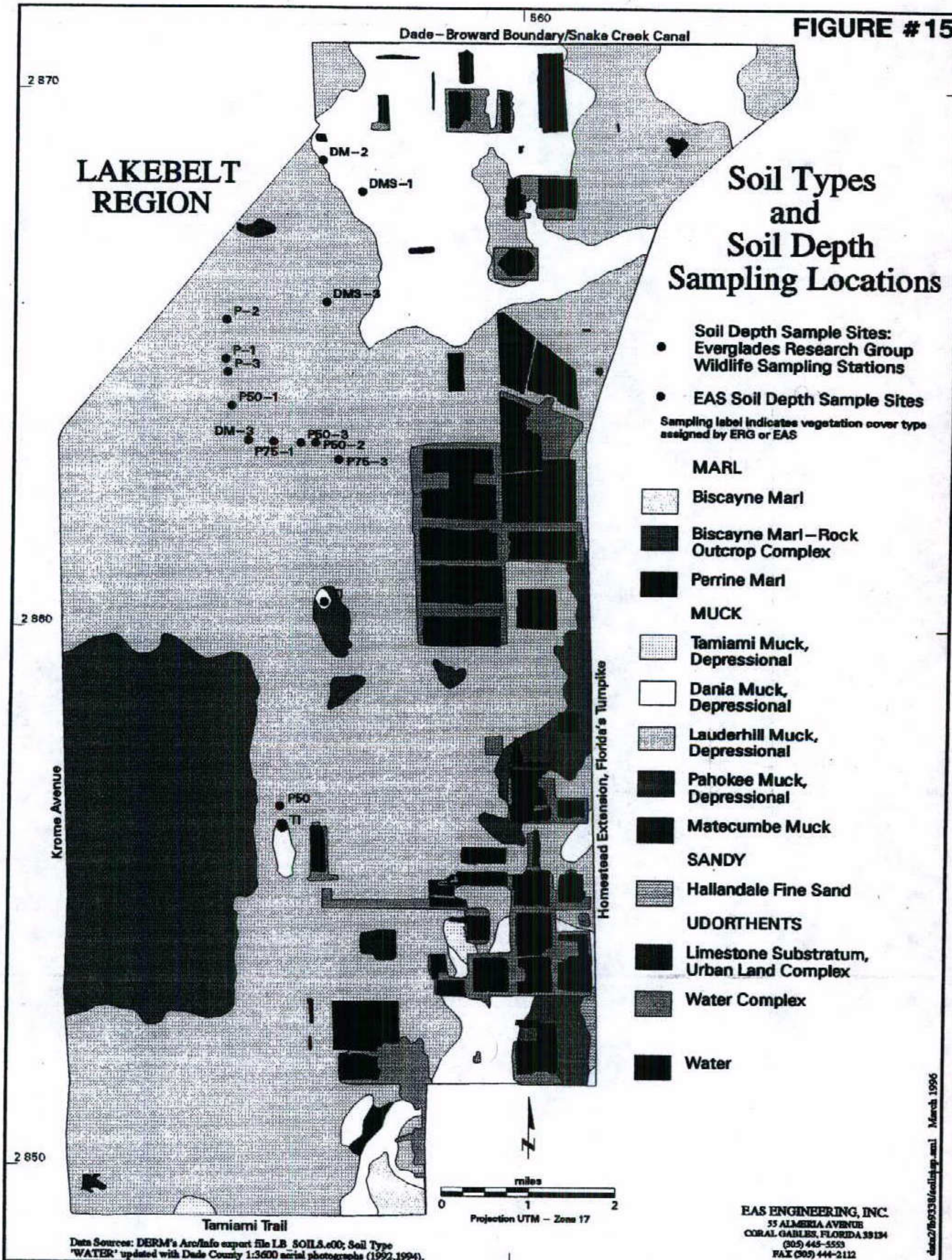


FIGURE #15
560
Dade-Broward Boundary/Snake Creek Canal
2 870
2 860
2 850
LAKEBELT
REGION
Soil Types
and
Soil Depth
Sampling Locations
DM-2
DMS-1
DMS-3
P-2
P-1
P-3
P50-1
DM-3
P50-3
P50-2
P75-1
P75-3
P50
TI
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
Soil Depth Sample Sites:
Everglades Research Group
Wildlife Sampling Stations
EAS Soil Depth Sample Sites
Sampling label indicates vegetation cover type assigned by ERG or EAS
MARL
Biscayne Marl
Biscayne Marl-Rock Outcrop Complex
Perrine Marl
MUCK
Tamiami Muck, Depressional
Dania Muck, Depressional
Lauderhill Muck, Depressional
Pahokee Muck, Depressional
Matecumbe Muck
SANDY
Hallandale Fine Sand
UDORTHENTS
Limestone Substratum, Urban Land Complex
Water Complex
Water
miles
0 1 2
Projection UTM - Zone 17
March 1996
Data Sources: DERM's Arc/Info export file LB_SOILS.e00; Soil Type 'WATER' updated with Dade County 1:3600 aerial photographs (1992,1994).
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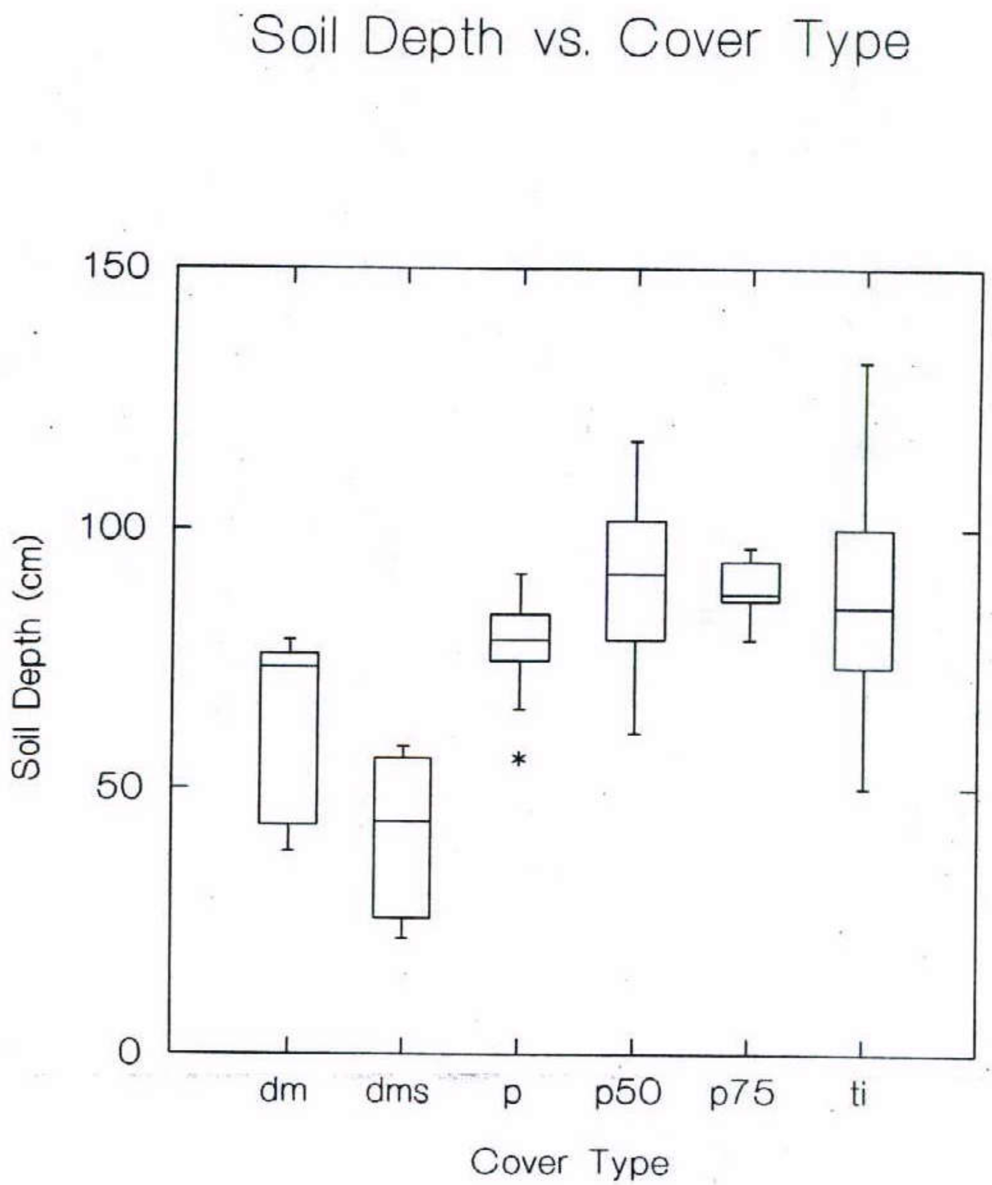
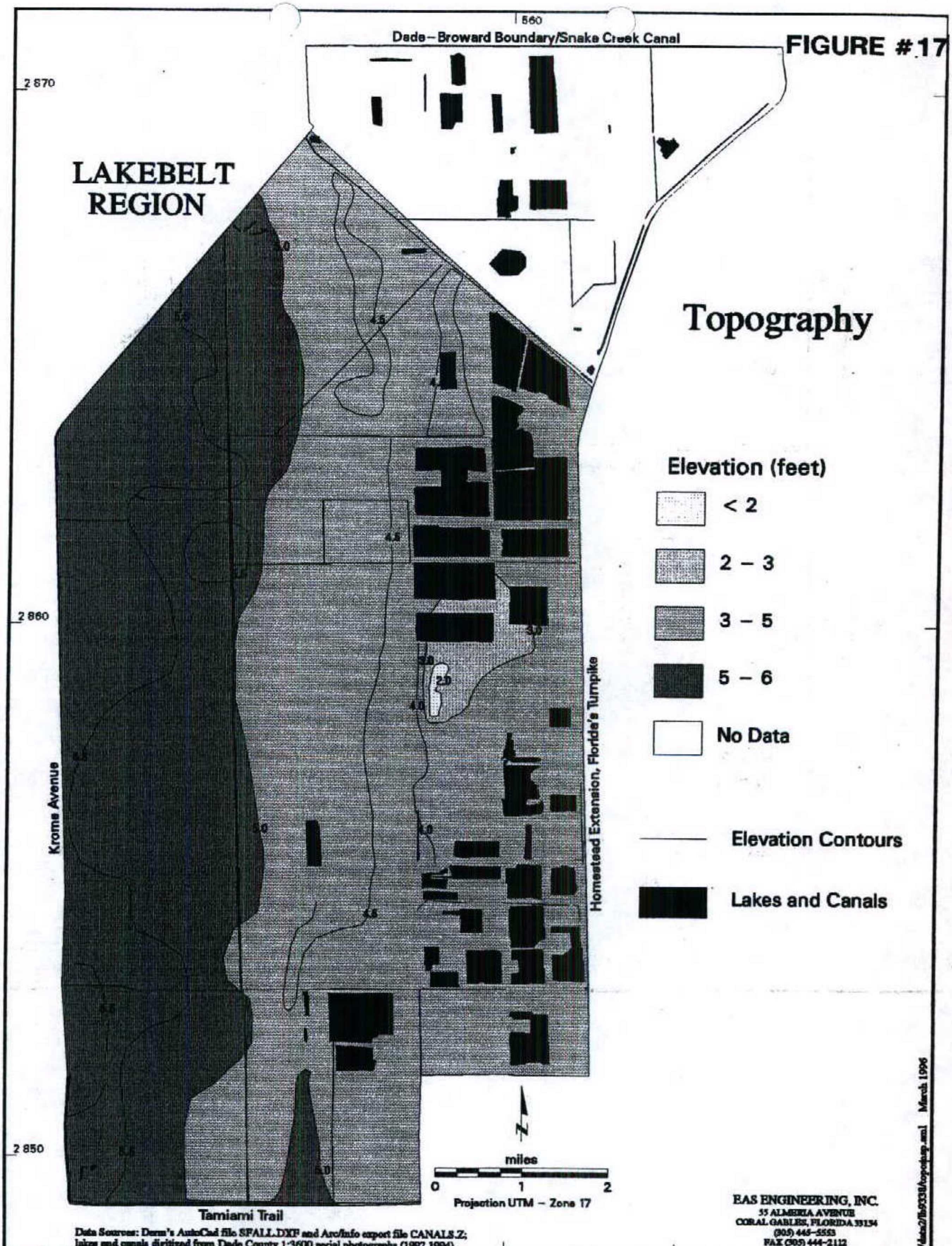
FIGURE #16



Soil Depth vs. Cover Type
150
100
50
0
Soil Depth (cm)
dm
dms
p
p50
p75
ti
Cover Type



560
Dade-Broward Boundary/Snake Creek Canal
FIGURE #17
2 870
2 860
2 850
LAKEBELT REGION
Topography
Elevation (feet)
< 2
2 - 3
3 - 5
5 - 6
No Data
Elevation Contours
Lakes and Canals
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
miles
0
1
2
Projection UTM - Zone 17
EAS ENGINEERING, INC.
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CORAL GABLES, FLORIDA 33134
(305) 445-5553
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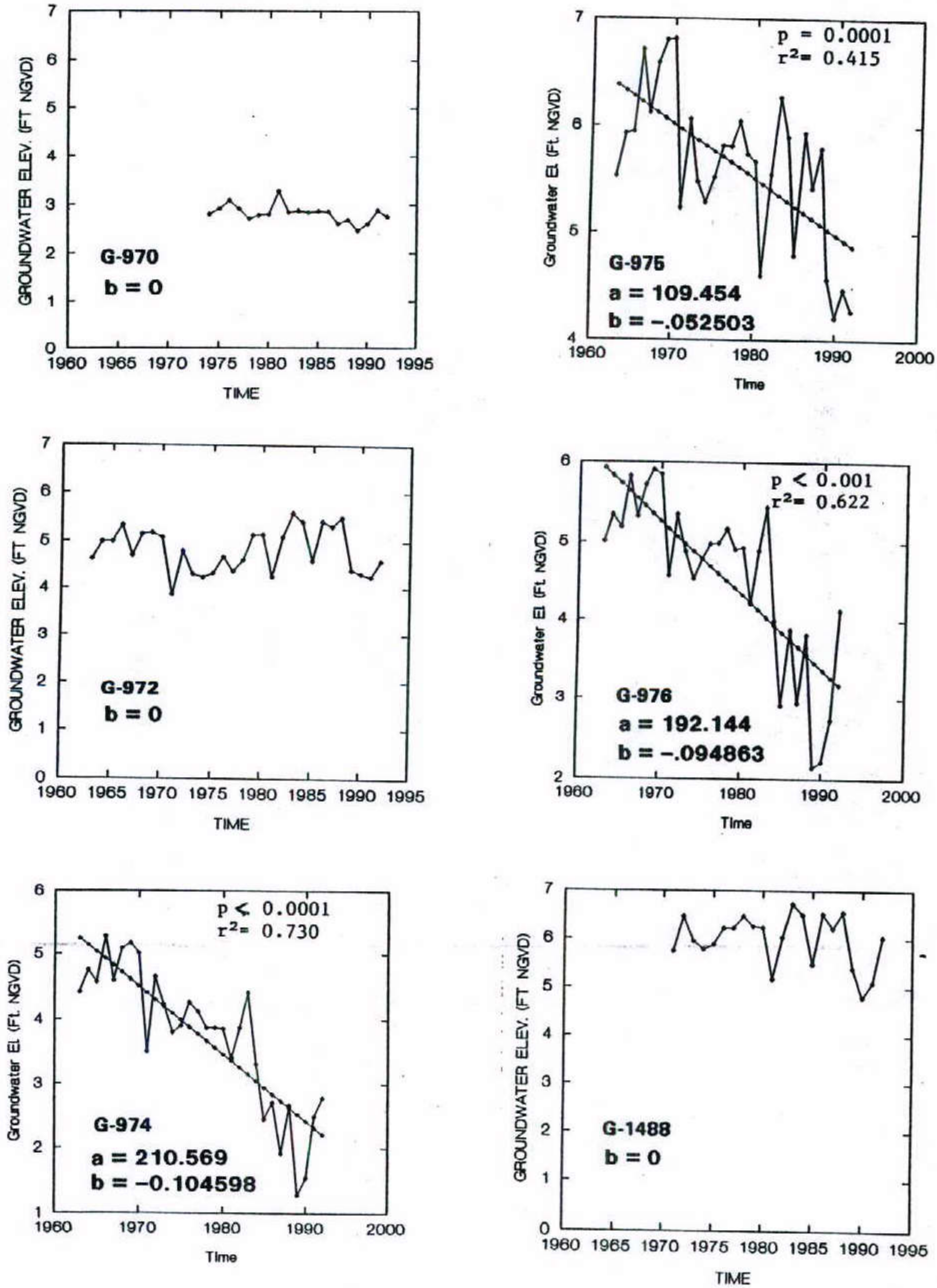
March 1996
Data Sources: Dern's AutoCad file SFALL.DXF and Arc/Info export file CANALS.Z;
lakes and canals digitized from Dade County 1:3600 aerial photographs (1992,1994).

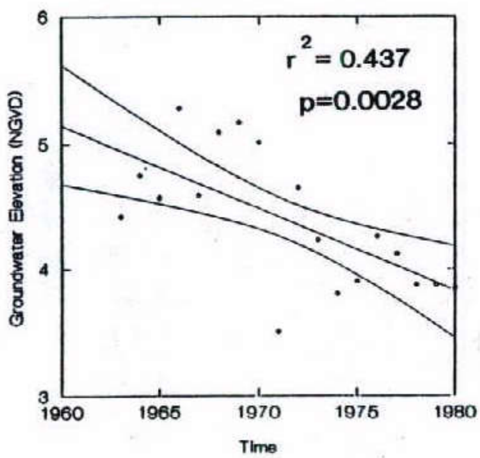
FIGURE # 18



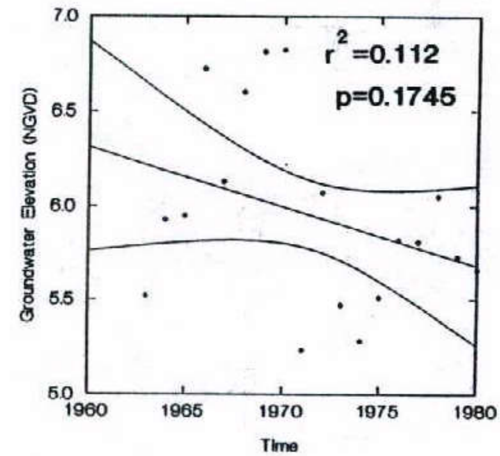
GROUNDWATER ELEV. (FT NGVD)
TIME
G-970
b = 0
Groundwater El (Ft. NGVD)
Time
p = 0.0001
r²= 0.415
G-975
a = 109.454
b = -.052503
GROUNDWATER ELEV. (FT NGVD)
TIME
G-972
b = 0
Groundwater El (Ft. NGVD)
Time
p < 0.001
r²= 0.622
G-976
a = 192.144
b = -.094863
Groundwater El (Ft. NGVD)
Time
p < 0.0001
r²= 0.730
G-974
a = 210.569
b = -0.104598
GROUNDWATER ELEV. (FT NGVD)
TIME
G-1488
b = 0

FIGURE # 19

G-974 Annual Avg Groundwater Elev.



G-975 Annual Avg Groundwater Elev.



G-976 Annual Avg Groundwater Elev.

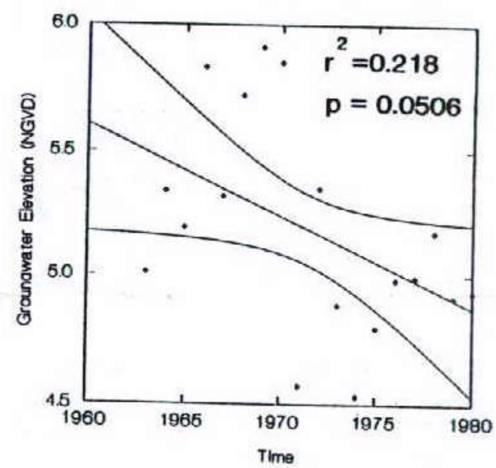


FIGURE #20

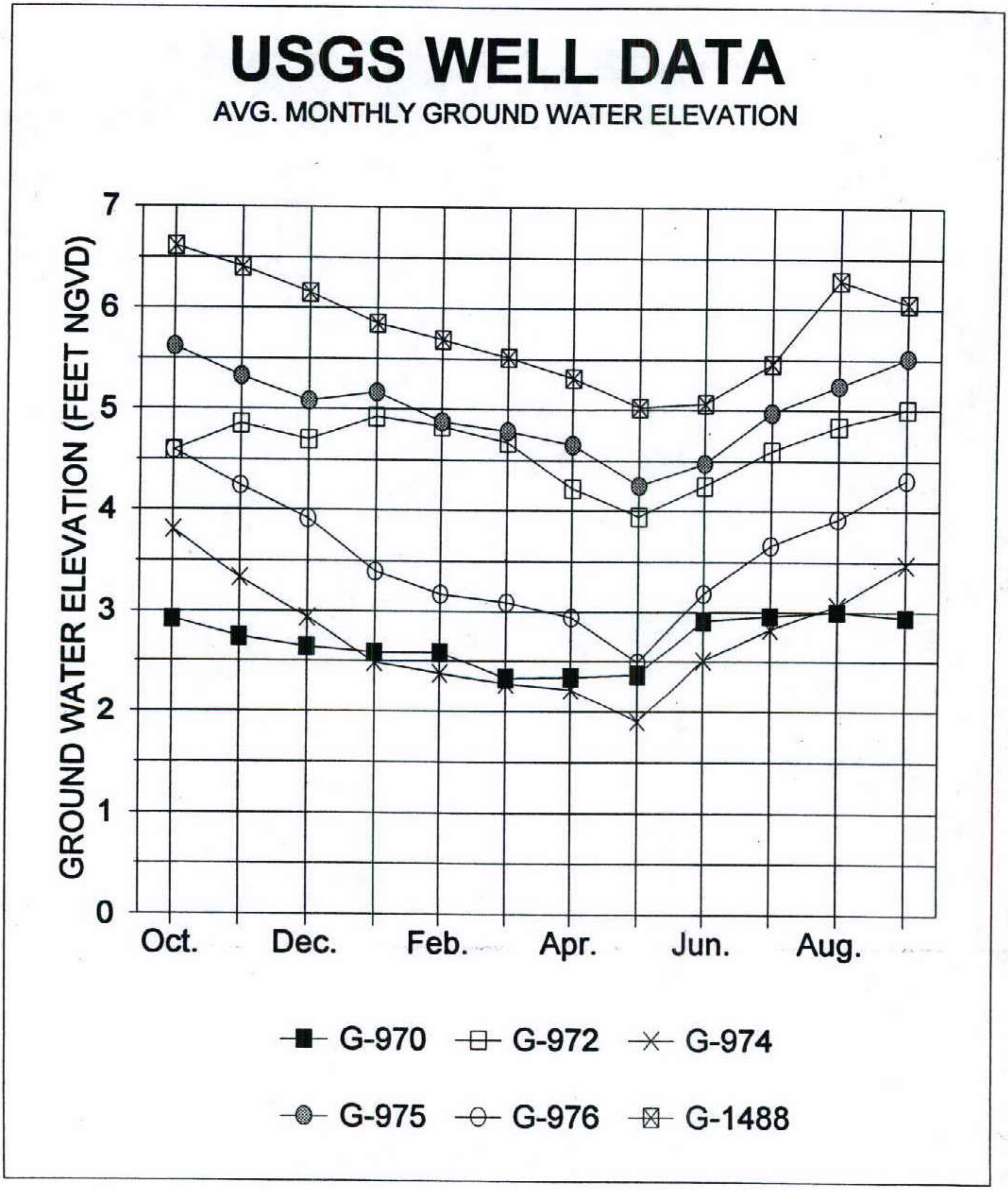
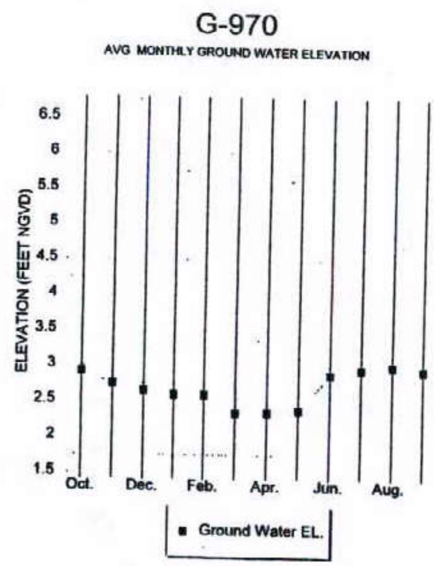
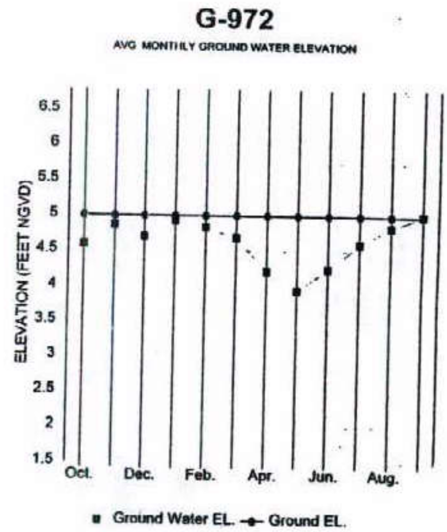
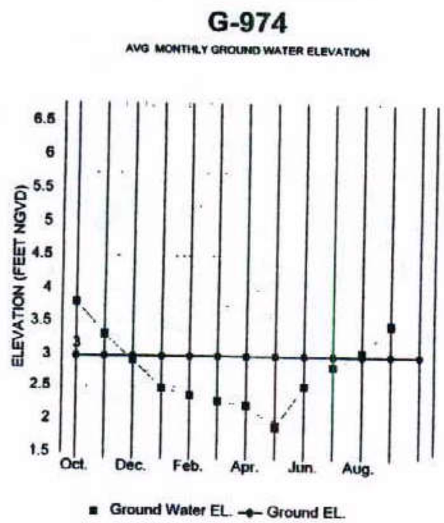
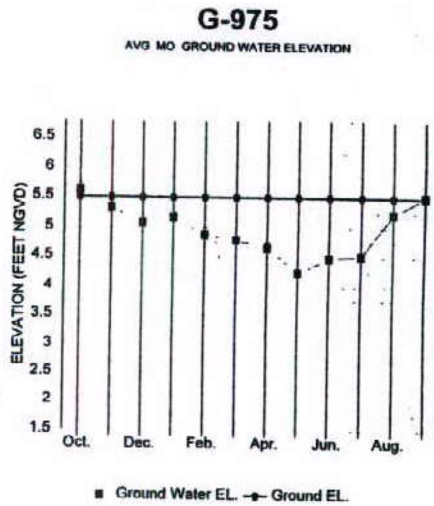

USGS WELL DATA
AVG. MONTHLY GROUND WATER ELEVATION
GROUND WATER ELEVATION (FEET NGVD)
7
6
5
4
3
2
1
0
Oct.
Dec.
Feb.
Apr.
Jun.
Aug.
G-970
G-972
G-974
G-975
G-976
G-1488

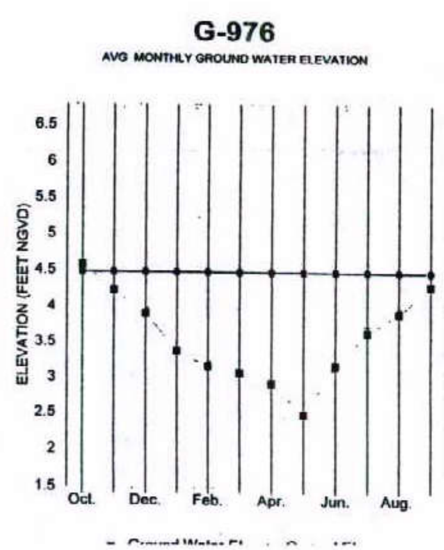
FIGURE #21

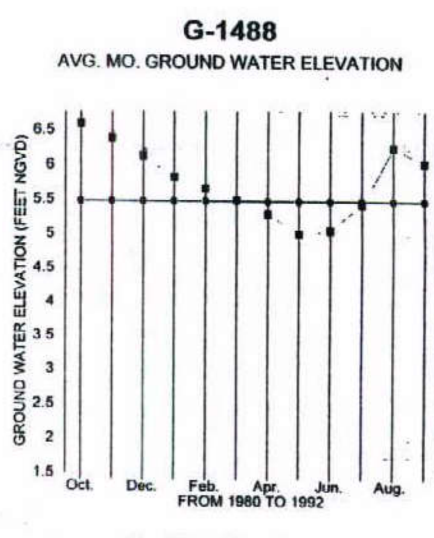

G-970
AVG MONTHLY GROUND WATER ELEVATION
ELEVATION (FEET NGVD)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
Oct.
Dec.
Feb.
Apr.
Jun.
Aug.
Ground Water EL.


G-972
AVG MONTHLY GROUND WATER ELEVATION
ELEVATION (FEET NGVD)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
Oct.
Dec.
Feb.
Apr.
Jun.
Aug.
Ground Water EL.
Ground EL.


G-974
AVG MONTHLY GROUND WATER ELEVATION
ELEVATION (FEET NGVD)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
Oct.
Dec.
Feb.
Apr.
Jun.
Aug.
Ground Water EL.
Ground EL.


G-975
AVG MO GROUND WATER ELEVATION
ELEVATION (FEET NGVD)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
Oct.
Dec.
Feb.
Apr.
Jun.
Aug.
Ground Water EL.
Ground EL.


G-976
AVG MONTHLY GROUND WATER ELEVATION
ELEVATION (FEET NGVD)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
Oct.
Dec.
Feb.
Apr.
Jun.
Aug.


G-1488
AVG. MO. GROUND WATER ELEVATION
GROUND WATER ELEVATION (FEET NGVD)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
Oct.
Dec.
Feb.
Apr.
Jun.
Aug.
FROM 1980 TO 1992

TABLES

Table 1. Acreages of the 18 Lakebelt Region Cover Types

		New Results		Previously Reported	
Natural Cover Types	Abbr.	Acres	Percent of Total	Acres	Percent of Total
Prairie	P	7,568	15.82	7,421	15.49
Prairie with Melaleuca (10-50%)	P50	4,272	8.93	4,252	8.88
Prairie with Melaleuca (50-75%)	P75	3,852	8.05	3,842	8.02
Dense Melaleuca	DM	10,578	22.11	10,639	22.21
Dense Melaleuca Saplings	DMS	6,540	13.67	6,660	13.91
Tree Islands	TI	277	0.58	267	0.56
Willow Heads	WH	26	0.05	26	0.05
Subtotals		33,113	69.21	33,107	69.13
Man-Altered Cover Types					
Disturbed (Forested and Open)	D	2,089	4.37	2,238	4.67
Disturbed Prairie	DP	19	0.04	19	0.04
Disturbed Prairie with Melaleuca (10-50%)	DP50	415	0.87	313	0.65
Disturbed Prairie with Melaleuca (50-75%)	DP75	217	0.45	212	0.44
Canals	C	326	0.68	340	0.71
Lakes	L	4,471	9.34	4,523	9.44
Lake Perimeter	LP	1,571	3.28	1,437	3.00
Other Water	W	491	1.03	481	1.00
Agriculture	AG	3,032	6.34	3,133	6.54
FPL Transmission Corridors	FPL	719	1.50	707	1.48
Developed	DV	1,380	2.88	1,384	2.89
Subtotals		14,731	30.79	14,787	30.87
TOTALS		47,844	100	47,894	100

Notes:

1. "New Results" include adjustments to coverages to match county Level II edge of pavement.

2. "Previously Reported" data were reported in EAS Engineering's Year 2 Report, dated December 14, 1995. These are the data used in the analyses presented in this report.

Table 2. Comparison of cover type acreages using 50% and 75% canopy closure to distinguish dense Melaleuca (M) from prairie (ML50 or ML75)

	50% Threshold			75% Threshold	
	Acres	%		Acres	%
C	340	0.7	C	340	0.7
D	8900	18.6	D	8900	18.6
L	5004	10.4	L	5004	10.4
M (>50)	21271	44.4	M (>75)	17218	35.9
ML 50	12112	25.3	ML 75	16166	33.8
TI	267	0.6	TI	267	0.0
Totals	47895	100.0	Totals	47895	99.4

C = Canals
D = Disturbed
L = Lakes
M (>50) = Dense Melaleuca (>50%)
M (>75) = Dense Melaleuca (>75%)
ML 50 = Prairie with <50% Melaleuca
ML 75 = Prairie with < 75% Melaleuca
TI = Tree Island

Table 3. Aerials used in the Melaleuca expansion study for selected sections.

SECTION:	5	22	30	4	12	28	29	5	
TOWNSHIP:	52	52	52	53	53	53	53	54	
RANGE:	40	39	39	39	39	39	39	39	
YEAR	MONTH								REF. YEAR**
1963*	✓	✓	✓	✓	✓	✓	✓	✓	"1963"
1971	Ja				Ja				
1972		Ja	Fe	Ja		Ja	Fe	De	"1972"
1976	Ja	Ja	De			Ja	Ja	De	"1976"
1977				Mr	Ja				
1979	Ja							Ja	
1980		Fe	Fe	Fe	Fe	Fe	Fe		"1980"
1983					Ja				
1984		Ja	Fe	Fe		Fe	Fe		"1984"
1985	Ja								
1986	De	Ja		Ja	Ja	Ja	Ja	Ja	"1986"
1987			Fe						
1989		Fe		Fe	Fe	Fe	My	My	"1989"
1990			Ap						
1992	Ja	Ja	Ja	Ja	Ja	Ja	Ja	Ja	"1992"

Ja= January; Fe = February; Mr = March; Ap = April; My = May; De = December

* Month for 1963 is not specified on the aerials.

** Ref. Year: Refers to the year categories used in EAS Engineering's Year 2 Report (EAS Engineering, 1995b) and in Figure 12 and Tables 5 through 12a of this report. For statistical analyses and graphs, the actual years of the aerials were used.

Table 4 Acreages of Cover Types per Decade: Entire Lakebelt Region

	Cover Type						
Decade	C	D	L	M	ML50	TI	Totals
1960's	358	2644	69	44	44019	762	47895
1970's	302	4579	852	2306	39299	557	47895
1980's	360	6350	2037	7689	31058	402	47895
1990's	340	8900	5004	21272	12112	267	47895

Table 4a Percent Cover of Cover Types per Decade

	Cover Type						
Decade	C	D	L	M	ML50	TI	Totals
1960's	0.7	5.5	0.1	0.1	91.9	1.6	100
1970's	0.6	9.6	1.8	4.8	82.1	1.2	100
1980's	0.8	13.3	4.3	16.1	64.8	0.8	100
1990's	0.7	18.6	10.4	44.4	25.3	0.6	100

C = Canals
D = Disturbed
L = Lakes
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca
TI = Tree Islands

Table 5 Acreages of Cover Types for Section 5-52-40: 1963-1992

Year	C	D	M	ML50	Total
1963	10	10	3	614	637
1972	13	19	9	595	637
1976	16	13	28	580	637
1980	13	18	108	497	637
1984	12	43	393	188	637
1986	13	31	379	214	637
1992	8	29	599	0	637

Table 5a Percent Cover of Cover Types for Section 5-52-40: 1963-1992

Year	C	D	M	ML50	Total
1963	1.6	1.5	0.4	96.5	100
1972	2.1	2.9	1.5	93.5	100
1976	2.5	2.0	4.4	91.1	100
1980	2.1	2.9	17.0	78.0	100
1984	2.0	6.7	61.8	29.6	100
1986	2.0	4.8	59.5	33.7	100
1992	1.3	4.6	94.1	0.0	100

C = Canals
D = Disturbed
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca

Table 6 Acreages of Cover Types for Section 22-52-39: 1963-1992

Year	D	M	ML50	Total
1963	6	1	618	625
1972	9	14	602	625
1976	6	120	499	625
1980	40	194	391	625
1984	36	282	307	625
1986	49	182	395	625
1989	78	289	259	625
1992	70	518	38	625

Table 6a Percent Cover of Cover Types for Section 22-52-39: 1963-199

Year	D	M	ML50	Total
1963	1.0	0.2	98.8	100
1972	1.5	2.2	96.3	100
1976	1.0	19.2	79.9	100
1980	6.4	31.1	62.5	100
1984	5.8	45.1	49.1	100
1986	7.8	29.1	63.2	100
1989	12.5	46.2	41.4	100
1992	11.2	82.8	6.0	100

D = Disturbed
M = Dense Melaleuca (>50%)
ML50 = Prairie with Melaleuca (<50%)

Table 7 A[illegible]ages of Cover Types for Section 3[illegible]2-39: 1963-1992

Year	C	D	M	ML50	Total
1963	10	34	0	603	646
1972	10	34	0	603	646
1976	10	34	41	562	646
1980	10	37	47	553	646
1984	10	36	23	578	646
1986	10	34	19	583	646
1989	10	43	9	584	646
1992	13	22	135	476	646

Table 7a Percent Cover of Cover Types for Section 30-52-39: 1963-199

Year	C	D	M	ML50	Total
1963	1.5	5.2	0.0	93.3	100
1972	1.5	5.2	0.0	93.3	100
1976	1.5	5.2	6.3	87.0	100
1980	1.5	5.7	7.2	85.6	100
1984	1.5	5.6	3.5	89.4	100
1986	1.5	5.2	3.0	90.3	100
1989	1.5	6.7	1.4	90.4	100
1992	2.1	3.4	20.9	73.7	100

C = Canals
D = Disturbed
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca

Table 8 Acreages of Cover Types for Section 4-53-39: 1963-1992

Year	D	L	M	ML50	TI	Total
1963	2	0	0	575	59	636
1972	2	0	3	574	57	636
1976	0	0	54	559	23	636
1980	0	0	79	532	25	636
1984	0	0	93	524	20	637
1986	0	0	102	514	21	637
1989	2	0	358	255	21	636
1992	2	0	611	0	23	636

Table 8a Percent Cover of Cover Types for Section 4-53-39: 1963-1992

Year	D	L	M	ML50	TI	Total
1963	0.4	0.0	0.0	90.4	9.2	100
1972	0.4	0.0	0.5	90.1	9.0	100
1976	0.0	0.0	8.5	87.9	3.7	100
1980	0.0	0.0	12.4	83.6	4.0	100
1984	0.0	0.0	14.6	82.3	3.1	100
1986	0.0	0.0	16.1	80.7	3.3	100
1989	0.4	0.0	56.3	40.0	3.3	100
1992	0.3	0.0	96.0	0.1	3.6	100

D = Disturbed
L = Lakes
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca
TI = Tree Island

Table 9 Acreages of Cover Types for Section 12-53-39: 1963-1992

Year	C	D	L	M	ML50	Total
1963	5	3	0	3	628	639
1972	5	3	0	19	612	639
1976	4	49	0	322	264	639
1980	7	104	0	256	273	639
1984	7	75	36	430	91	639
1986	7	78	36	507	10	639
1989	7	54	36	541	1	639
1992	20	37	36	547	0	639

Table 9a Percent Cover of Cover Types for Section 12-53-39: 1963-199

Year	C	D	L	M	ML50	Total
1963	0.8	0.5	0.0	0.4	98.2	100
1972	0.8	0.5	0.0	3.0	95.7	100
1976	0.7	7.7	0.0	50.3	41.3	100
1980	1.1	16.2	0.0	40.0	42.7	100
1984	1.1	11.7	5.7	67.3	14.2	100
1986	1.1	12.3	5.7	79.4	1.6	100
1989	1.1	8.4	5.7	84.7	0.1	100
1992	3.1	5.8	5.6	85.5	0.0	100

C = Canals
D = Disturbed
L = Lakes
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca

Table 10 Acreages of Cover Types for Section 28-53-39: 1963-1992

Year	C	D	M	ML50	TI	Total
1963	8	2	0	624	3	638
1972	0	15	1	619	3	638
1976	0	7	133	495	3	638
1980	0	8	149	478	3	638
1984	0	7	155	474	3	638
1986	0	9	109	518	3	638
1989	0	15	288	332	3	638
1992	0	13	524	98	3	638

Table 10a Percent Cover of Cover Types for Section 28-53-39: 1963-199

Year	C	D	M	ML50	TI	Total
1963	1.3	0.3	0.0	97.8	0.5	100
1972	0.0	2.3	0.2	97.0	0.5	100
1976	0.0	1.1	20.8	77.6	0.5	100
1980	0.0	1.2	23.4	74.9	0.5	100
1984	0.0	1.1	24.2	74.2	0.5	100
1986	0.0	1.4	17.0	81.1	0.5	100
1989	0.0	2.4	45.1	52.0	0.5	100
1992	0.0	2.0	82.1	15.4	0.5	100

C = Canals
D = Disturbed
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca
TI = Tree Island

Table 11 Acreages of Cover Types for Section 29-53-39: 1963-1992

Year	C	D	M	ML50	TI	Total
1963	6	0	0	613	18	637
1972	0	7	0	613	18	637
1976	0	3	0	616	18	637
1980	0	3	0	616	18	637
1984	0	3	0	616	18	637
1986	0	3	0	616	18	637
1989	0	2	3	616	16	637
1992	0	0	380	249	9	637

Table 11a Percent Cover of Cover Types for Section 29-53-39: 1963-199

Year	C	D	M	ML50	TI	Total
1963	1.0	0.0	0.0	96.2	2.8	100
1972	0.0	1.0	0.0	96.2	2.8	100
1976	0.0	0.5	0.0	96.7	2.8	100
1980	0.0	0.5	0.0	96.7	2.8	100
1984	0.0	0.5	0.0	96.7	2.8	100
1986	0.0	0.5	0.0	96.7	2.8	100
1989	0.0	0.3	0.5	96.6	2.6	100
1992	0.0	0.0	59.7	39.0	1.3	100

C = Canals
D = Disturbed
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca
TI = Tree Island

Table 12 Acreages of Cover Types for Section 5-54-39: 1963-1992

Year	C	D	M	ML50	TI	Total
1963	6	12	0	424	6	448
1972	6	12	0	424	6	448
1976	6	12	11	413	6	448
1980	6	11	22	403	6	448
1986	6	10	12	420	1	448
1989	6	10	78	353	1	448
1992	3	6	423	15	1	448

Table 12a Percent Cover of Cover Types for Section 5-54-39: 1963-1992

Year	C	D	M	ML50	TI	Total
1963	1.3	2.6	0.0	94.6	1.4	100
1972	1.3	2.6	0.0	94.6	1.4	100
1976	1.3	2.6	2.4	92.2	1.4	100
1980	1.3	2.4	4.8	90.0	1.4	100
1986	1.3	2.1	2.6	93.8	0.2	100
1989	1.3	2.3	17.3	78.9	0.1	100
1992	0.6	1.4	94.5	3.3	0.1	100

C = Canals
D = Disturbed
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca
TI = Tree Island

Table 13. Distribution of Cover Types (in acres) on Soil Types.

Soil Type	C	D	L	M	ML50	TI	Subtotal	Percent
	Cover Type							
Limestone	0.05	117.54	1.81	4.93	1.29	0.00	126	0.26
Water Complex	18.06	1813.58	83.95	222.29	37.99	5.59	2,181	4.55
Biscayne Marl	1.81	41.20	0.94	13.64	128.46	0.00	186	0.39
Bisc Marl - Rock	1.68	296.54	1.35	0.00	0.00	0.00	300	0.63
Perrine Marl	0.00	51.80	0.00	0.28	12.52	0.00	65	0.13
Dania Muck	51.20	2700.16	54.93	2657.25	575.32	121.54	6,160	12.86
Lauderhill Muck	206.73	3564.42	308.80	16745.92	6701.55	72.81	27,600	57.63
Pahokee Muck	25.74	191.28	21.02	1669.93	4554.23	59.44	6,522	13.62
Tamiami Muck	2.53	47.87	8.05	38.22	19.13	0.00	116	0.24
Demroy Muck	0.00	0.06	0.00	0.00	0.00	0.00	0	0.00
Matecumbe Muck	0.00	0.00	0.00	0.70	0.00	8.11	9	0.02
Hallandale Sand	0.47	63.26	0.00	0.00	0.00	0.00	64	0.13
Water	31.63	12.66	4522.83	0.00	0.00	0.00	4,567	9.54
Totals	340	8,900	5,004	21,353	12,030	267	47,895	100.00

Table 13a. Percent of Each Cover Type Occupying Each Soil Type.

Soil Type	C	D	L	M	ML50	TI
	Cover Type					
Limestone	0.01	1.32	0.04	0.02	0.01	0.00
Water Complex	5.31	20.38	1.68	1.04	0.32	2.09
Biscayne Marl	0.53	0.46	0.02	0.06	1.07	0.00
Bisc Marl - Rock	0.49	3.33	0.03	0.00	0.00	0.00
Perrine Marl	0.00	0.58	0.00	0.00	0.10	0.00
Dania Muck	15.06	30.34	1.10	12.44	4.78	45.44
Lauderhill Muck	60.82	40.05	6.17	78.42	55.70	27.22
Pahokee Muck	7.57	2.15	0.42	7.82	37.86	22.22
Tamiami Muck	0.74	0.54	0.16	0.18	0.16	0.00
Demroy Muck	0.00	0.00	0.00	0.00	0.00	0.00
Matecumbe Muck	0.00	0.00	0.00	0.00	0.00	3.03
Hallandale Sand	0.14	0.71	0.00	0.00	0.00	0.00
Water	9.31	0.14	90.39	0.00	0.00	0.00
Totals	100	100	100	100	100	100

C = Canals
D = Disturbed
L = Lakes
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca

TABLE 14. SOIL DEPTHS COLLECTED DURING LAKEBELT STUDY

	ERG Station ID												EAS Covertype		
	P-1	P-2	P-3	P50-1	P50-2	P50-3	P75-2	P75-3	DMS-3	DMS1	DM-2	DM-3	P50	TI	TI
S-T-R	20-52-39	20-52-39	20-52-39	29-52-3	28-52-39	28-52-39	28-52-39	27-52-39	15-52-39	10-52-39	15-52-39	28-52-39	16-53-39	4-53-39	21-53-39
	76.20	76.20	55.88	63.50	60.96	83.82	93.98	78.74	58.42	21.59	43.18	76.20	104.14	50.00	115.57
	88.90	83.82	91.44	83.82	78.74	76.20	83.82	86.36	55.88	22.86	43.18	73.66	96.52	60.00	132.08
	76.20	71.12	78.74	71.12	83.82	93.98	86.36	88.90	53.34	34.29	48.26	76.20	88.90	70.00	91.44
	78.74	68.58	91.44	76.20	78.74	91.44	96.52	96.52	55.88	25.40	38.10	73.66	90.17	75.00	86.36
	78.74	83.82	73.66	76.20	76.20	81.28	86.36	88.90	58.42	30.48	73.66	78.74	96.52	50.00	130.81
													83.82	80.00	81.28
													99.06	100.00	88.9
													111.76	100.00	83.82
													91.44	100.00	78.74
													93.98	90.00	73.66
													110.49	70.00	86.36
													109.22		
													116.84		
													102.87		
													111.76		
													99.06		
													101.60		
													111.76		
													99.06		
Sum	398.78	383.54	391.16	370.84	378.46	426.72	447.04	439.42	281.94	134.62	246.38	378.46	104.14	845.00	1049.02
Mean	79.76	76.71	78.23	74.17	75.69	85.34	89.41	87.88	56.39	26.92	49.28	75.69	101.00	76.82	95.37
Standard Error	2.36	3.15	6.59	3.35	3.89	3.27	2.46	2.85	0.95	2.39	6.30	0.95	2.11	5.73	6.26
Median	78.74	76.20	78.74	76.20	78.74	83.82	86.36	88.90	55.88	25.40	43.18	76.20	104.14	75.00	86.36
SD	5.27	7.05	14.75	7.49	8.69	7.32	5.51	6.38	2.13	5.34	14.10	2.13	24.95	30.04	35.56
Variance	27.74	49.68	217.42	56.13	75.48	53.55	30.32	40.65	4.52	28.55	198.71	4.52	84.47	902.27	1264.66
Range	12.70	15.24	35.56	20.32	22.86	17.78	12.70	17.78	5.08	12.70	35.56	5.08	33.02	100.00	1264.66
Minimum	76.20	68.58	55.88	63.50	60.96	76.20	83.82	78.74	53.34	21.59	38.10	73.66	83.82	50.00	73.66
Maximum	88.90	83.82	91.44	83.82	83.82	93.98	96.52	96.52	58.42	34.29	73.66	78.74	116.84	100.00	132.08

All Depths in Centimeters

Table 15. Distribution of Cover Types (in acres) vs. Elevation.

	Cover Type							
Elevation	C	D	L	M	ML50	TI	Subtotals	Percent
<2 Feet	0.00	4.10	13.02	35.62	0.00	0.00	52.74	0.13
2-3 Feet	0.00	103.42	342.00	421.48	0.00	0.00	866.90	2.16
3-5 Feet	79.88	4,925.64	4,006.26	12,720.44	2,551.37	168.50	24,452.09	60.89
5-6 Feet	60.36	241.79	18.74	4,990.17	9,422.04	52.14	14,785.24	36.82
Totals	140.24	5,274.95	4,380.02	18,167.71	11,973.41	220.64	40,156.97	100

Table 15a. Percent of Each Cover Type Occupying Each Elevation.

	Cover Type					
Elevation	C	D	L	M	ML50	TI
<2 Feet	0.00	0.08	0.30	0.20	0.00	0.00
2-3 Feet	0.00	1.96	7.81	2.32	0.00	0.00
3-5 Feet	56.96	93.38	91.47	70.02	21.31	76.37
5-6 Feet	43.04	4.58	0.43	27.47	78.69	23.63
Totals	100.00	100.00	100.00	100.00	100.00	100.00

C = Canals
D = Disturbed
L = Lakes
M = Dense Melaleuca (>50%)
ML50 = Prairie with <50% Melaleuca
TI = Tree Island

Table 16. Annual average groundwater elevations from 1963 to 1992 for six wells used in this study (using Water Years: October 1 - September 30) in feet NGVD.

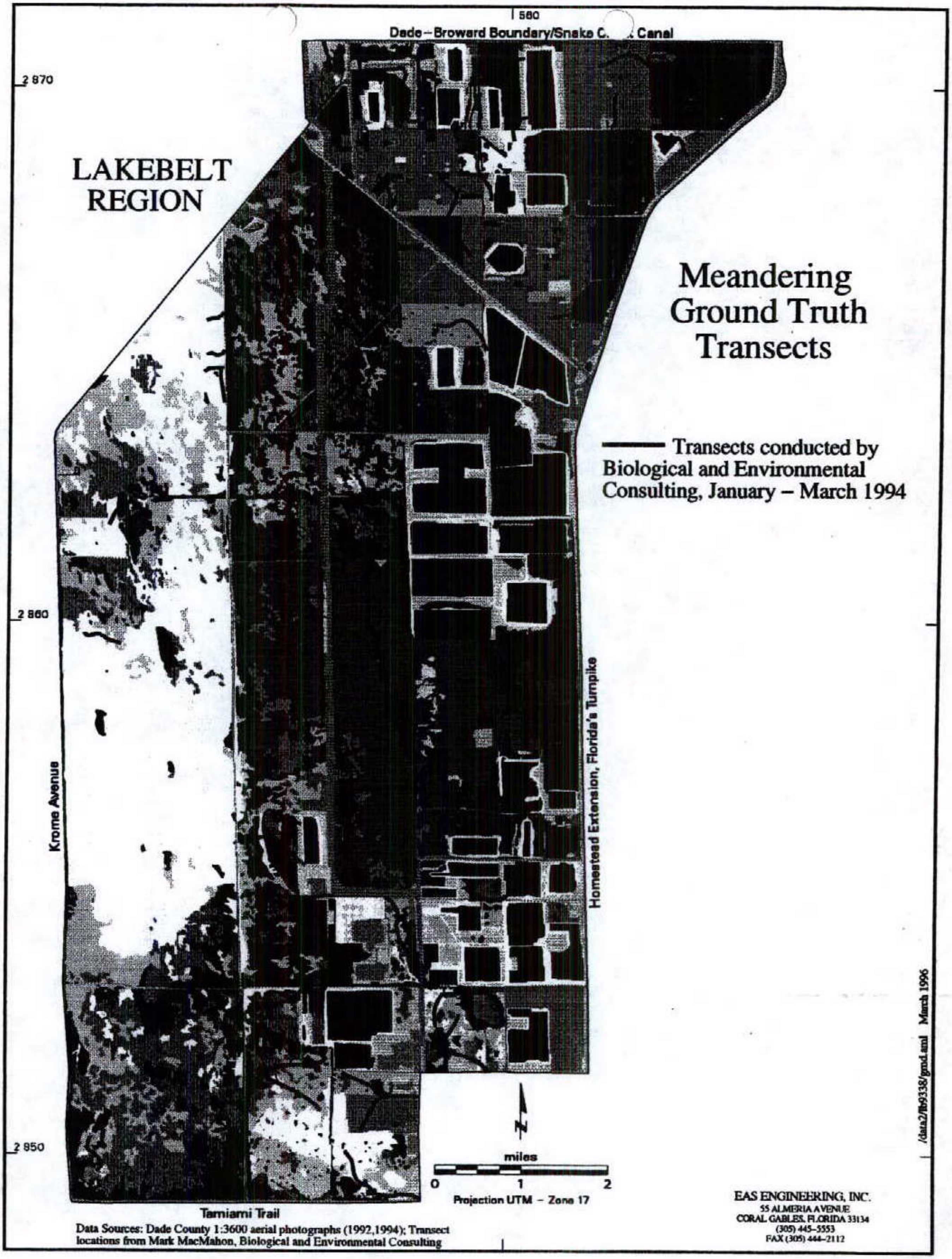
Year	G-970	G-972	G-974	G-975	G-976	G-1488
1963		4.62	4.42	5.52	5.01	
1964		4.99	4.75	5.93	5.34	
1965		4.99	4.57	5.95	5.19	
1966		5.33	5.28	6.72	5.83	
1967		4.69	4.59	6.13	5.32	
1968		5.15	5.09	6.60	5.72	
1969		5.18	5.17	6.81	5.91	
1970		5.08	5.01	6.82	5.85	
1971		3.85	3.51	5.23	4.57	5.74
1972		4.79	4.65	6.07	5.35	6.46
1973		4.30	4.23	5.47	4.88	5.95
1974	2.80	4.23	3.80	5.28	4.53	5.78
1975	2.91	4.32	3.89	5.51	4.79	5.88
1976	3.08	4.66	4.26	5.82	4.98	6.22
1977	2.91	4.36	4.12	5.81	4.99	6.22
1978	2.71	4.60	3.87	6.05	5.17	6.46
1979	2.78	5.14	3.87	5.73	4.91	6.26
1980	2.80	5.15	3.85	5.66	4.93	6.23
1981	3.27	4.25	3.41	4.60	4.20	5.17
1982	2.84	5.10	3.87	5.54	4.89	6.04
1983	2.87	5.59	4.41	6.28	5.44	6.72
1984	2.84	5.41	3.31	5.90	3.99	6.49
1985	2.86	4.59	2.45	4.79	2.91	5.47
1986	2.85	5.42	2.71	5.94	3.88	6.51
1987	2.61	5.32	1.91	5.41	2.94	6.22
1988	2.69	5.50	2.67	5.79	3.81	6.54
1989	2.47	4.40	1.28	4.57	2.15	5.39
1990	2.61	4.32	1.54	4.21	2.22	4.80
1991	2.88	4.25	2.49	4.47	2.73	5.11
1992	2.76	4.59	2.78	4.27	4.12	6.04
Averages	2.82	4.81	3.73	5.63	4.55	5.99

Table 17. Average Monthly Groundwater Elevations for the Period 1980 through 1992 in six wells used in this study (feet NGVD)

	Well G-970	Well G-972	Well G-974	Well G-975	Well G-976	Well G-1488
Oct.	2.92	4.59	3.81	5.62	4.60	6.62
Nov.	2.74	4.86	3.33	5.33	4.25	6.41
Dec.	2.64	4.70	2.93	5.08	3.91	6.15
Jan.	2.59	4.93	2.49	5.17	3.39	5.85
Feb.	2.59	4.83	2.38	4.88	3.17	5.69
Mar.	2.33	4.68	2.28	4.79	3.09	5.52
Apr.	2.34	4.22	2.08	4.65	2.94	5.32
May	2.37	3.94	1.90	4.25	2.49	5.02
Jun.	2.90	4.25	2.51	4.48	3.18	5.07
Jul.	2.96	4.60	2.82	4.97	3.66	5.46
Aug.	3.00	4.84	3.06	5.24	3.92	6.28
Sep.	2.94	5.01	3.47	5.51	3.95	6.06

APPENDIX A

Map of ground-truthing Transects



Data Sources: Dade County 1:3600 aerial photographs (1992,1994); Transect locations from Mark MacMahon, Biological and Environmental Consulting

APPENDIX B

Explanation of Discrepancies between EAS and ERG Cover Types

Explanation of inconsistencies between ERG and EAS cover type designations.

During the final stages of this study, it became apparent that in eleven cases, cover type designations assigned by the Everglades Research Group (ERG) to their sampling stations differed from those assigned by EAS Engineering.

These discrepancies result from several factors. EAS, throughout its mapping effort, used a macro-scale approach, while ERG used a micro-scale approach for vegetation mosaics that exist within the study area. EAS used a 0.5 acre resolution threshold, that is, land cover patches smaller than 1/2 acre were not mapped. Another factor for ERG was the inaccessibility of large, contiguous patches of these habitats which occur in the remoter regions of the study area, making it preferable to establish stations in smaller but more readily accessible areas of the various cover types. Another factor is that the base aerial photography was already two years old when the ERG established its stations.

EAS acknowledged from the very beginning of the project that variation would be found within the agreed-upon density categories. It is the vegetation experts' decision where the polygon lines are drawn around the density categories. EAS' decisions were based on extensive ground-truthing of portions of the study area, helicopter overflights of the entire study area, and several QA/QC iterations of the 1992 aerial photography.

The eleven disrepancies between the cover type designations of EAS and ERG were the following:

1. Three cases of P50 (two in 30-53-39 and one 29-52-39) vs P: two of these sites are in the Pennsuco along Krome Avenue, and the third in the Pennsuco near the northwest wellfield canal. In the two sites along Krome Avenue, we mapped this area as P50, which by definition has a wide array of Melaleuca densities. ERG no doubt found areas within this that either (1) had no Melaleuca, or (2) contained only Melaleuca seedlings, and thus were not noticed by the wildlife observers. The site near the northwest wellfield has already been documented to be a small patch of P50 within a wide expanse of P.

2. One case of P50 (15-53-39) vs P75. In this location there were a few micro areas that from the ground could have looked like the denser portion of P50. Our decision was to classify this entire polygon P75 based on the scale of the P50 patches.

3. One case of P75 (27-52-39) vs P50. This site is in a large area of P50 that from the ground appears to have occasional patches of P75. EAS classified the entire area as P50 based on the scale of the P75 patches.

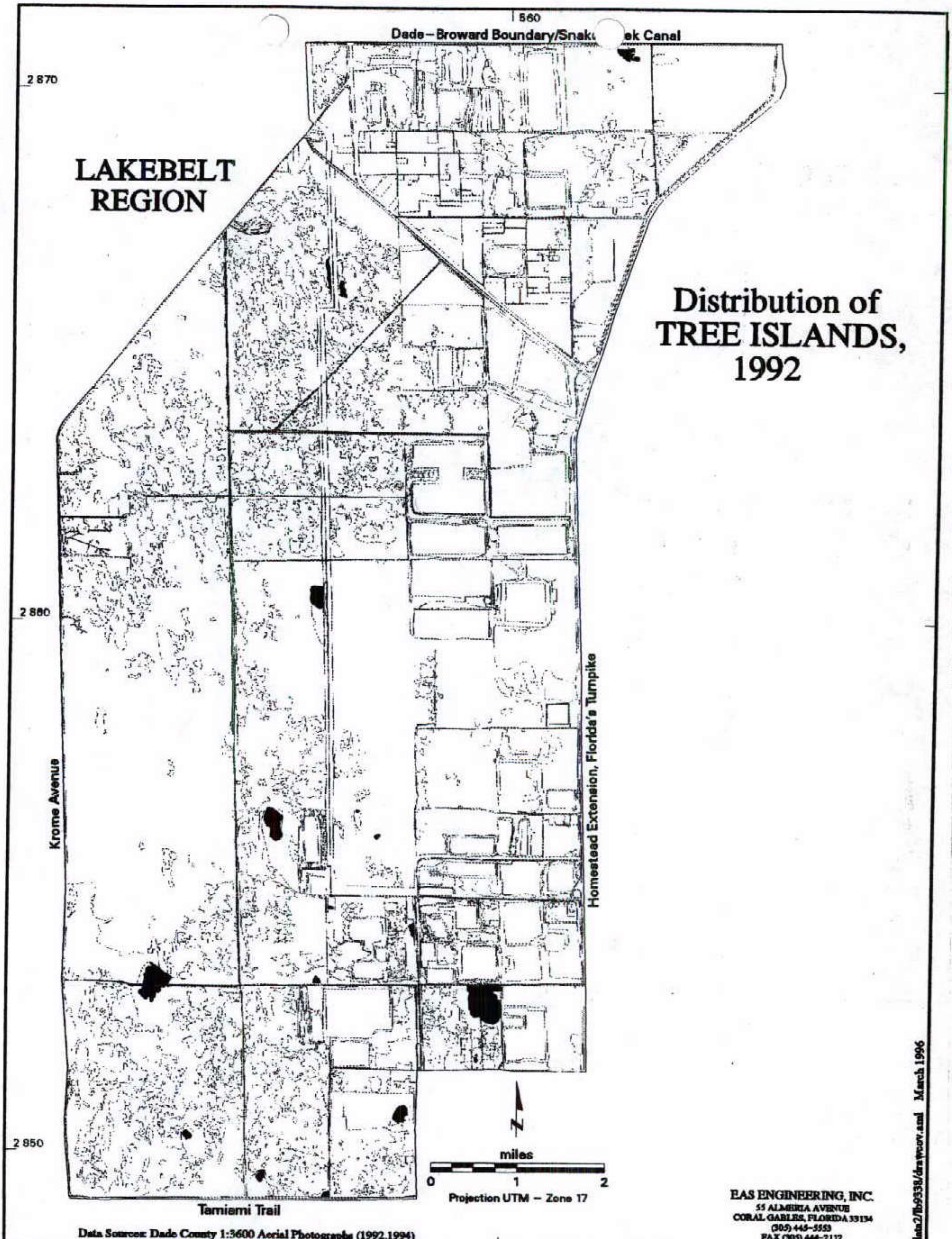
4. One case of DMS (15-52-39) vs P50. This site is in a large area of P50 that from the ground has occasional patches of P75 and DMS. EAS' decision was to classify the entire area as P50 based on the scale of the P75 and DMS patches.

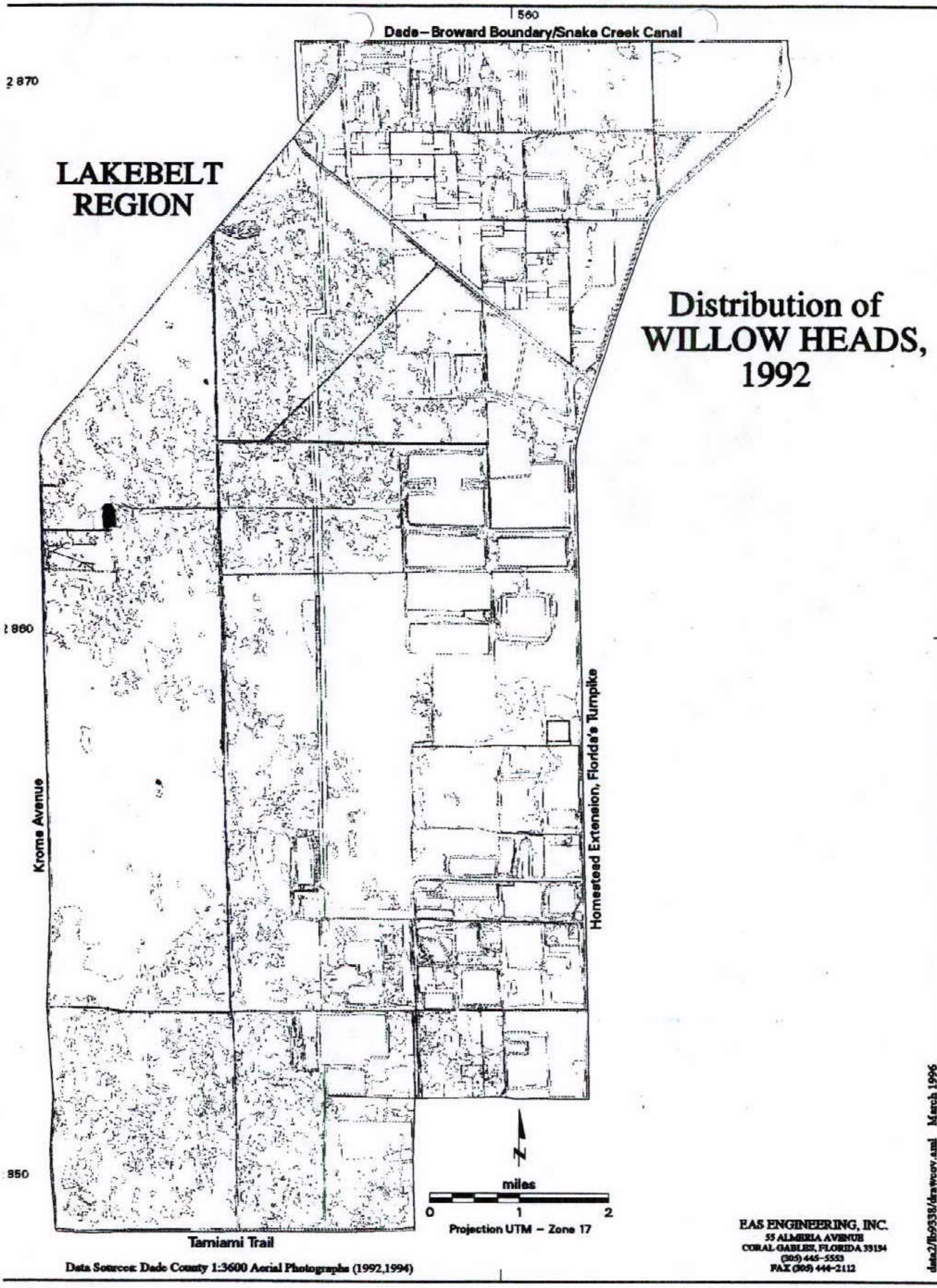
5. Five cases of DMS (27-52-39, two in 5-54-39, 10-52-39, and 15-52-39) vs DM. In each of these discrepancies, ERG classified these areas as DMS, while we classified them as DM. EAS used the DM classification instead of DMS when individual trees or canopies were visible within the cover type on the 1"=300' aerials. Many of the areas that on the ground appear to be DMS appear to be DM on the aerial photographs. EAS was consistent in mapping these areas as DM. The differentiation between DMS and DM on the aerial signatures is somewhat arbitrary in many places.

In hindsight, it would have been preferable to establish the wildlife stations after the cover types had been mapped, so that potentially larger areas of "contiguous" habitat could have been sampled. Nonetheless, the extraordinarily patchy mosaic of Melaleuca densities will probably indicate that there is little difference in wildlife utilization of areas from 0% to 75% dense, as well as in DM and DMS, as long as the underlying prairie/marsh associations are still relatively intact.

APPENDIX C

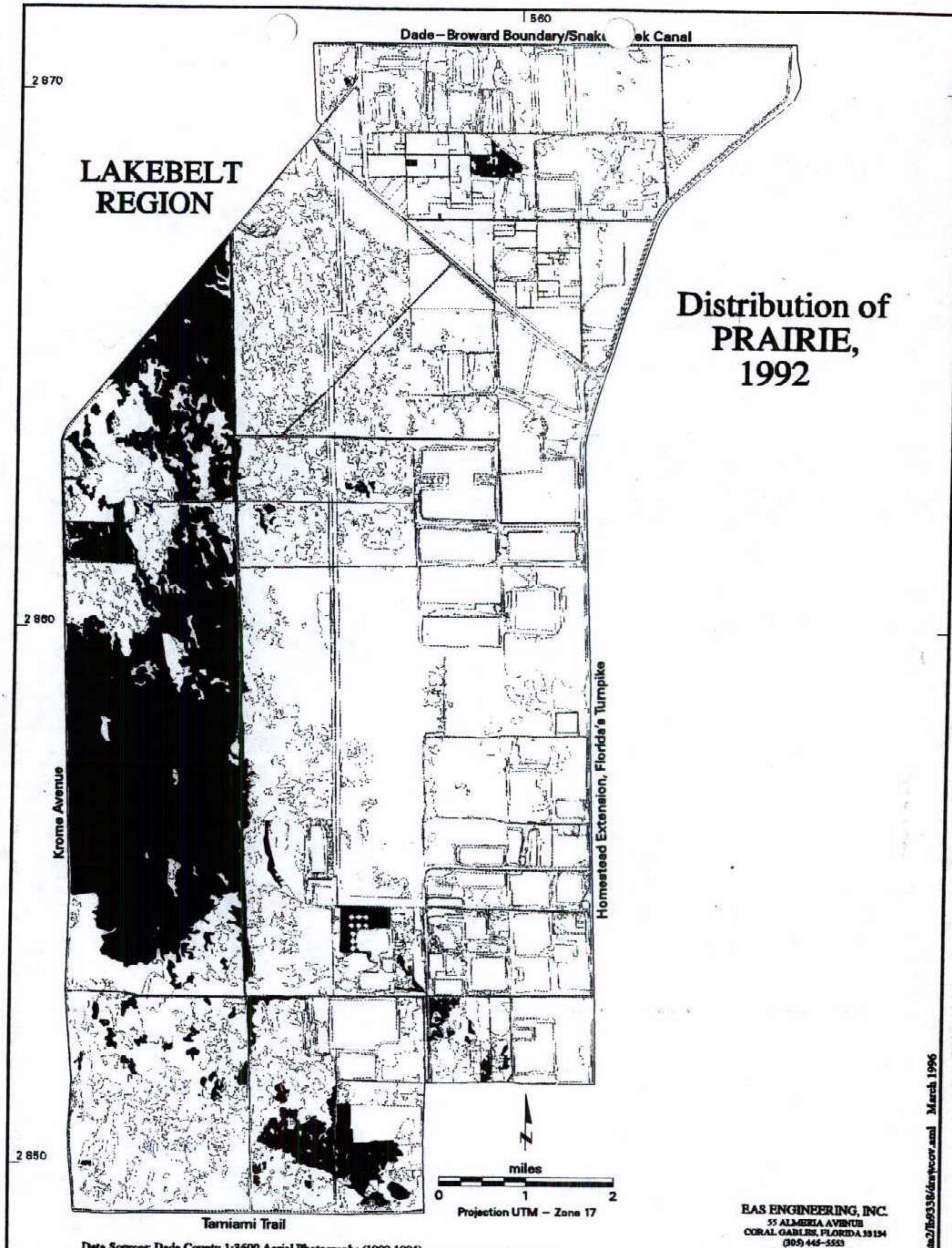
Individual Maps of Cover Type Distribution in the Lake Belt Region

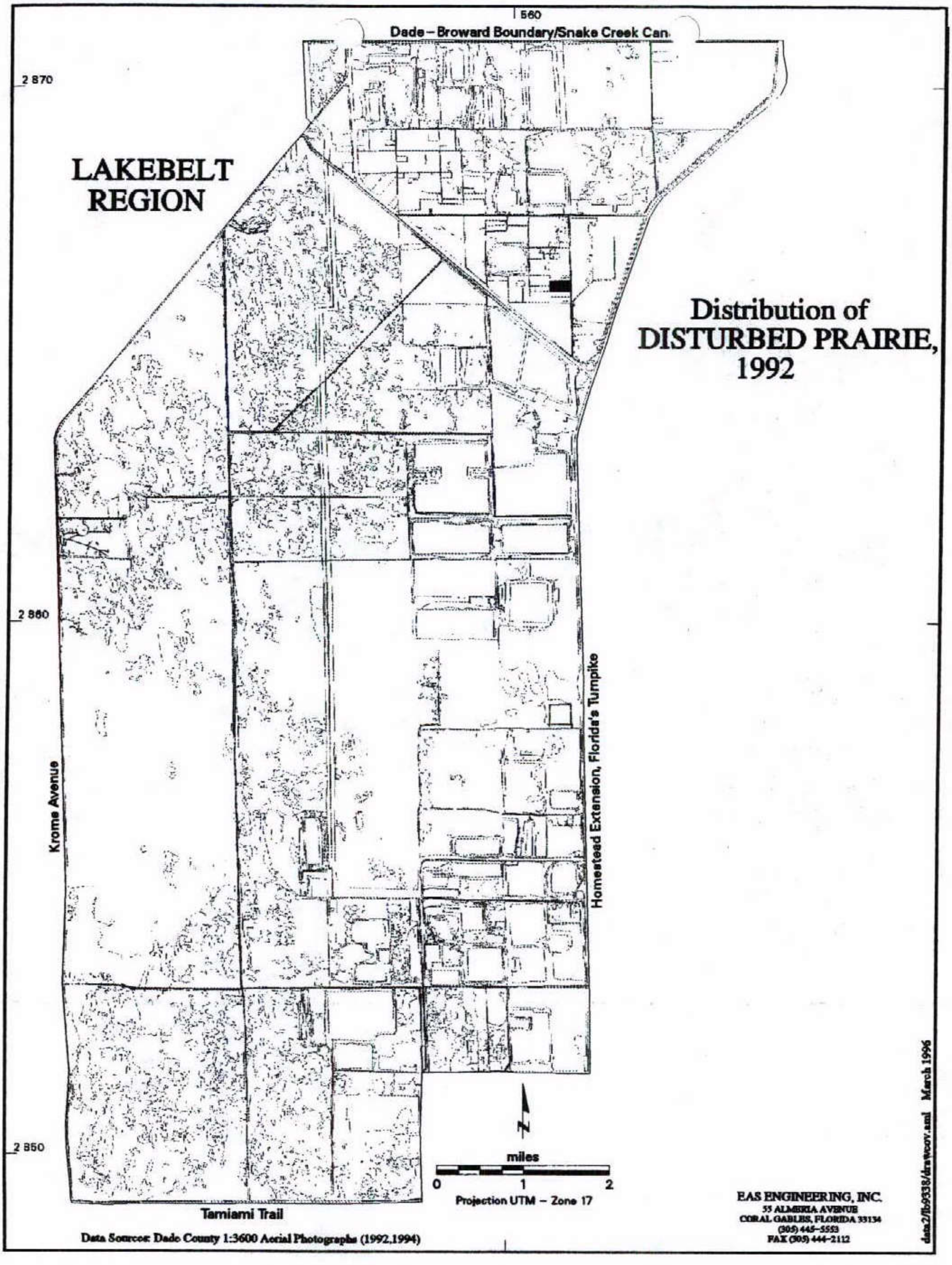

560
Dade–Broward Boundary/Snak ek Canal
2 870
LAKEBELT
REGION
Distribution of
TREE ISLANDS,
1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
N
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
data2/lb9338/drawcov.aml March 1996



560
Dade–Broward Boundary/Snake Creek Canal
2 870
LAKEBELT
REGION
Distribution of
WILLOW HEADS,
1992
860
Homestead Extension, Florida's Turnpike
Krome Avenue
850
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445–5553
FAX (305) 444–2112
data2/lb9338/drawcov.aml March 1996

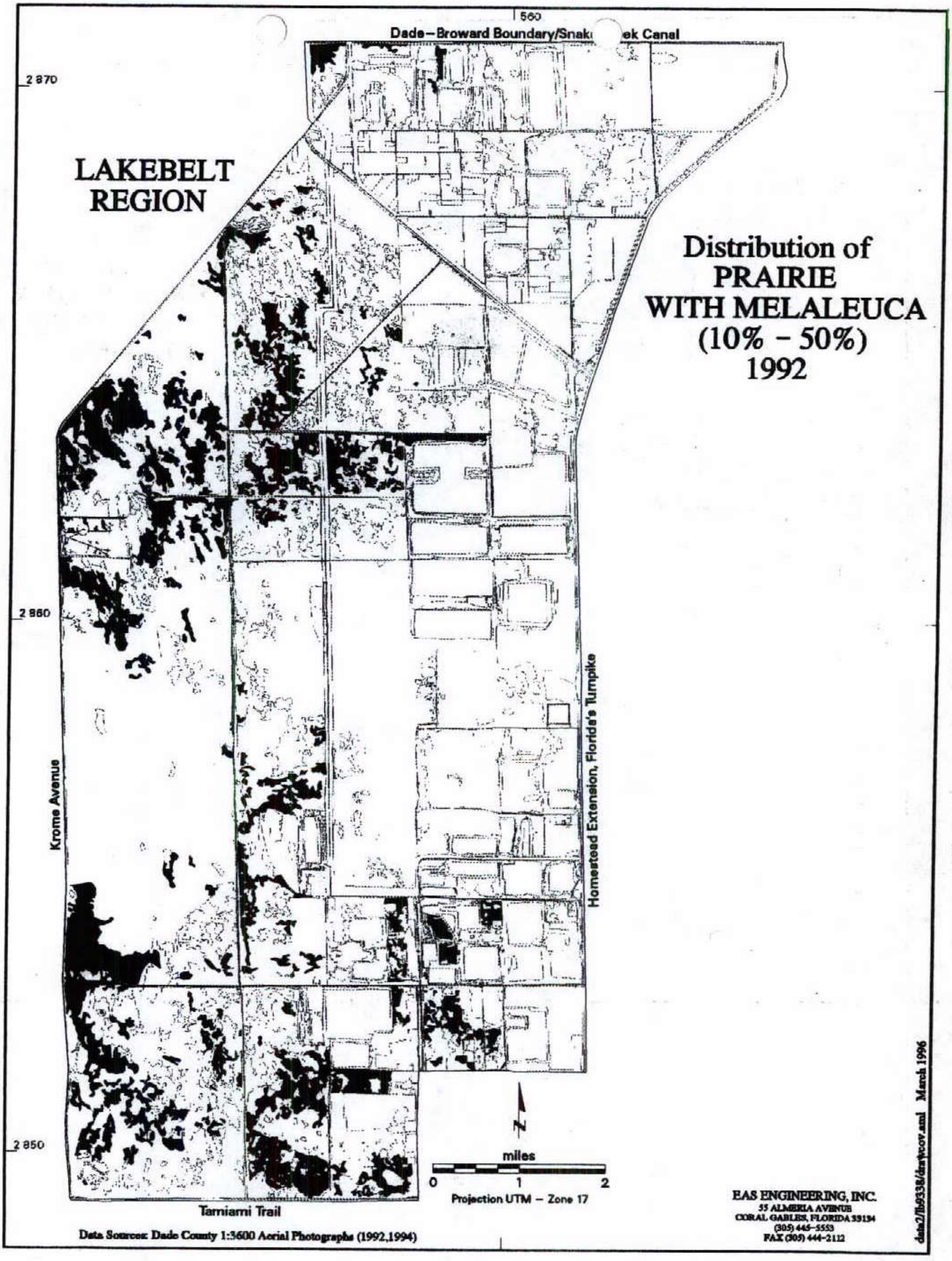
DOC#614

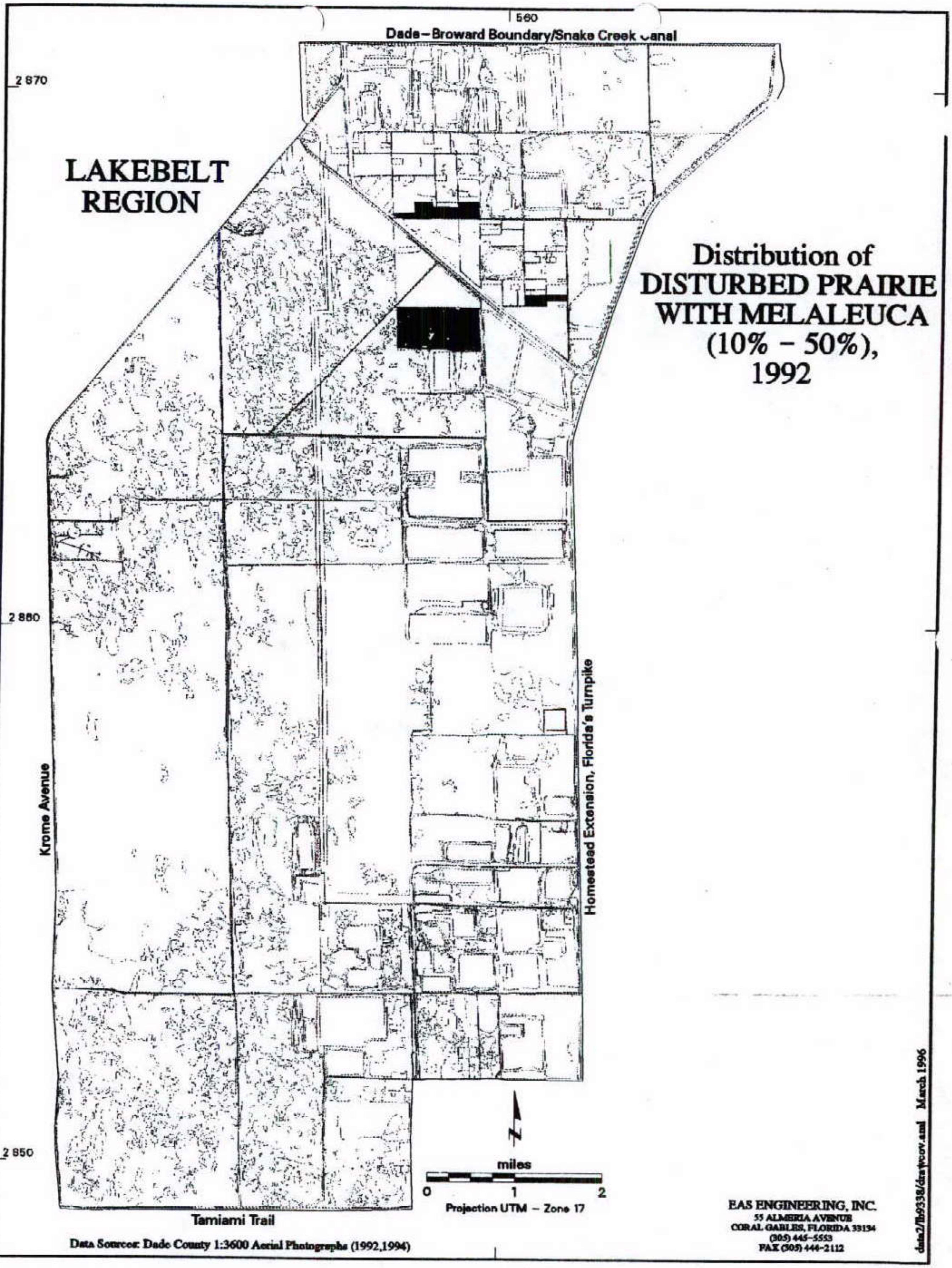

LAKEBELT REGION
Distribution of PRAIRIE, 1992
560
Dade–Broward Boundary/Snak ek Canal
2 870
2 860
2 850
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
miles
0 1 2
Projection UTM – Zone 17
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996

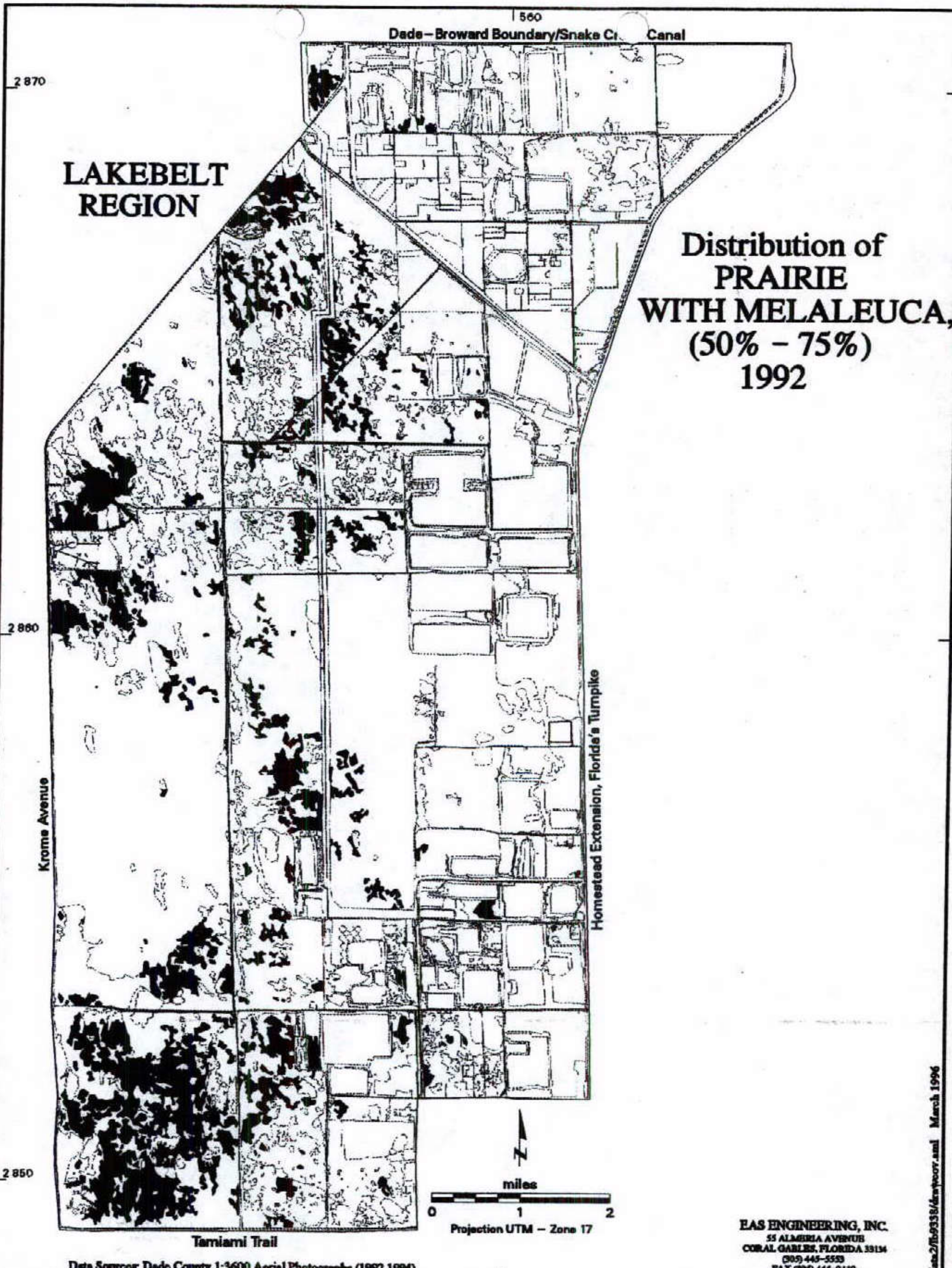


560
Dade – Broward Boundary/Snake Creek Can.
2 870
LAKEBELT
REGION
Distribution of
DISTURBED PRAIRIE,
1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445–5553
FAX (305) 444–2112
data2/lb9338/drawcov.aml March 1996

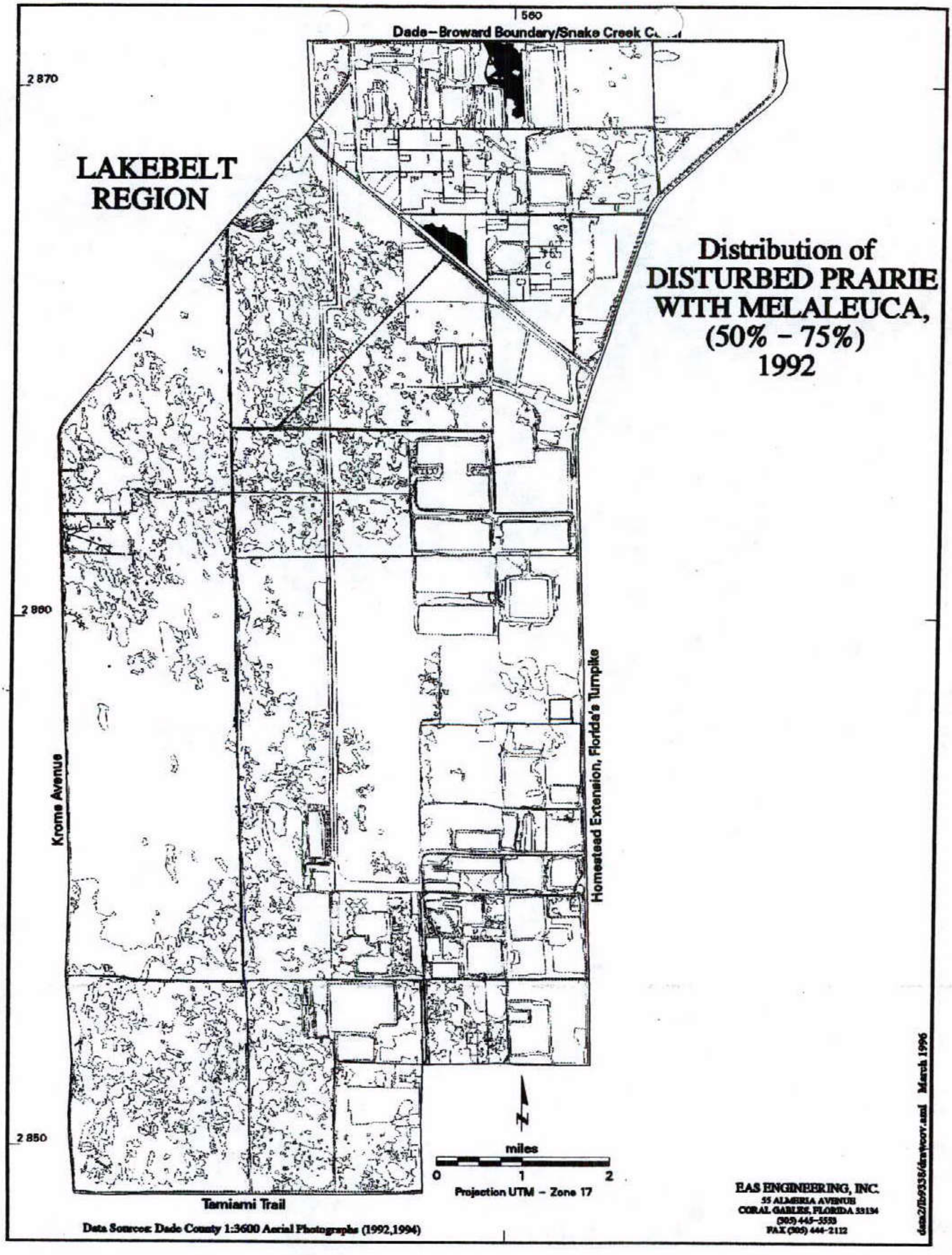
DOC#614


560
Dade–Broward Boundary/Snak ek Canal
2 870
LAKEBELT
REGION
Distribution of
PRAIRIE
WITH MELALEUCA
(10% – 50%)
1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996

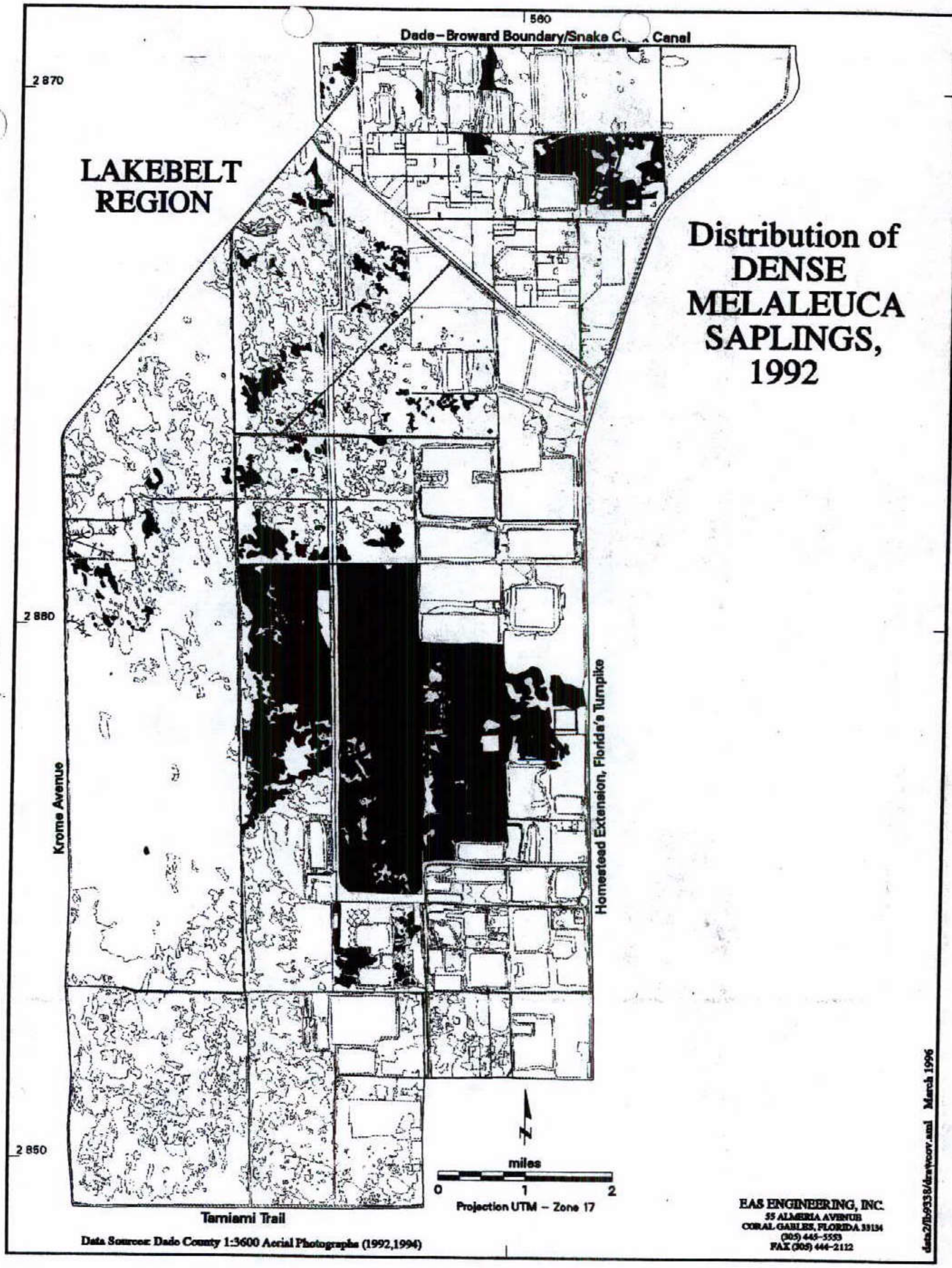

560
Dade–Broward Boundary/Snake Creek Canal
2 870
LAKEBELT REGION
Distribution of DISTURBED PRAIRIE WITH MELALEUCA (10% – 50%), 1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0 1 2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996



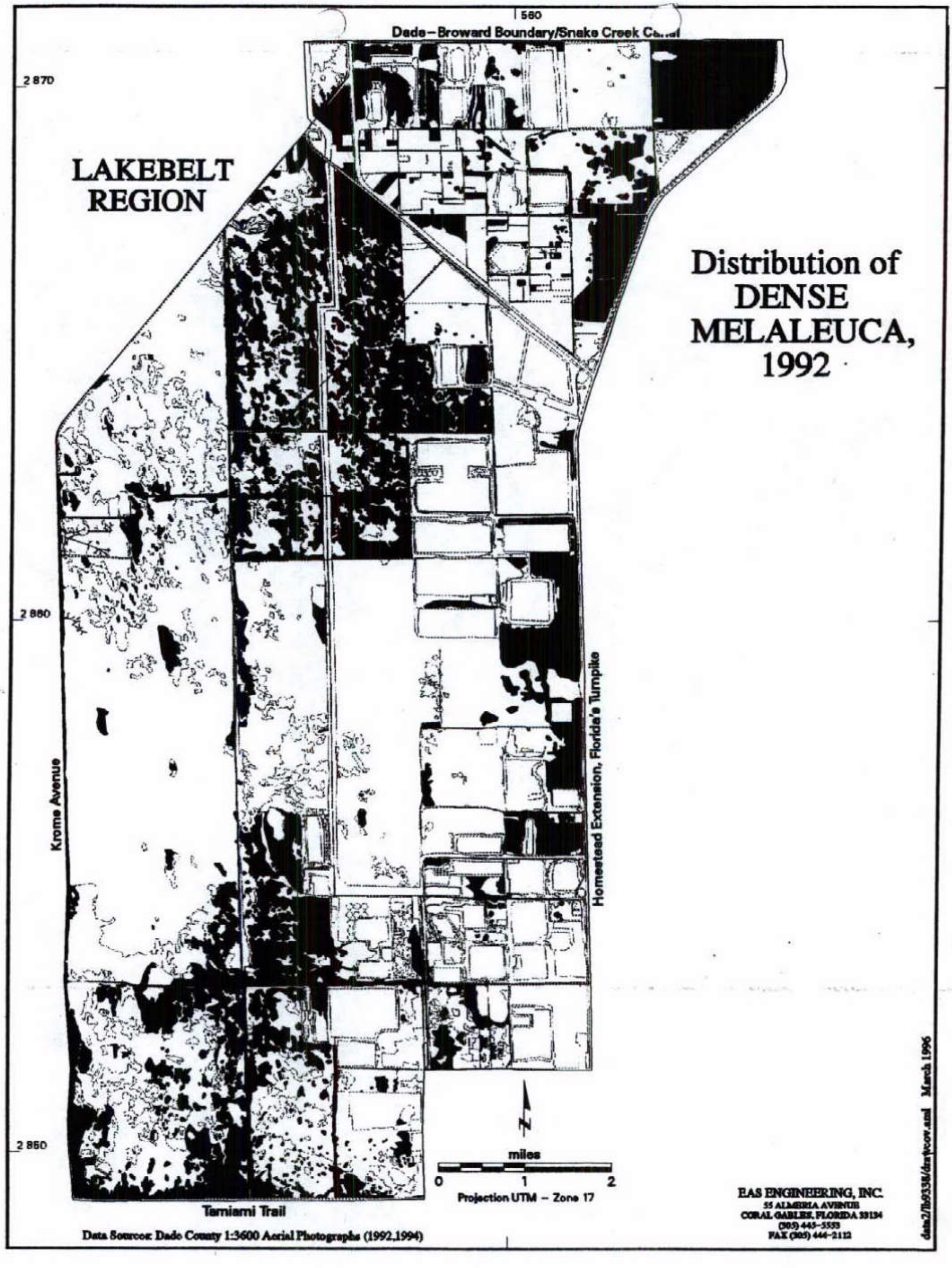
560
Dade–Broward Boundary/Snake Cr. Canal
2 870
LAKEBELT
REGION
Distribution of
PRAIRIE
WITH MELALEUCA,
(50% – 75%)
1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996



560
Dade-Broward Boundary/Snake Creek C
2 870
LAKEBELT
REGION
Distribution of
DISTURBED PRAIRIE
WITH MELALEUCA,
(50% - 75%)
1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM - Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996



560
Dade-Broward Boundary/Snake Cr... Canal
2 870
LAKEBELT REGION
Distribution of DENSE MELALEUCA SAPLINGS, 1992
2 880
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM - Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996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REGION
Distribution of
DENSE
MELALEUCA,
1992
560
Dade-Broward Boundary/Snake Creek Canal
2 870
2 860
2 850
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
miles
0
1
2
Projection UTM - Zone 17
Data Source: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996

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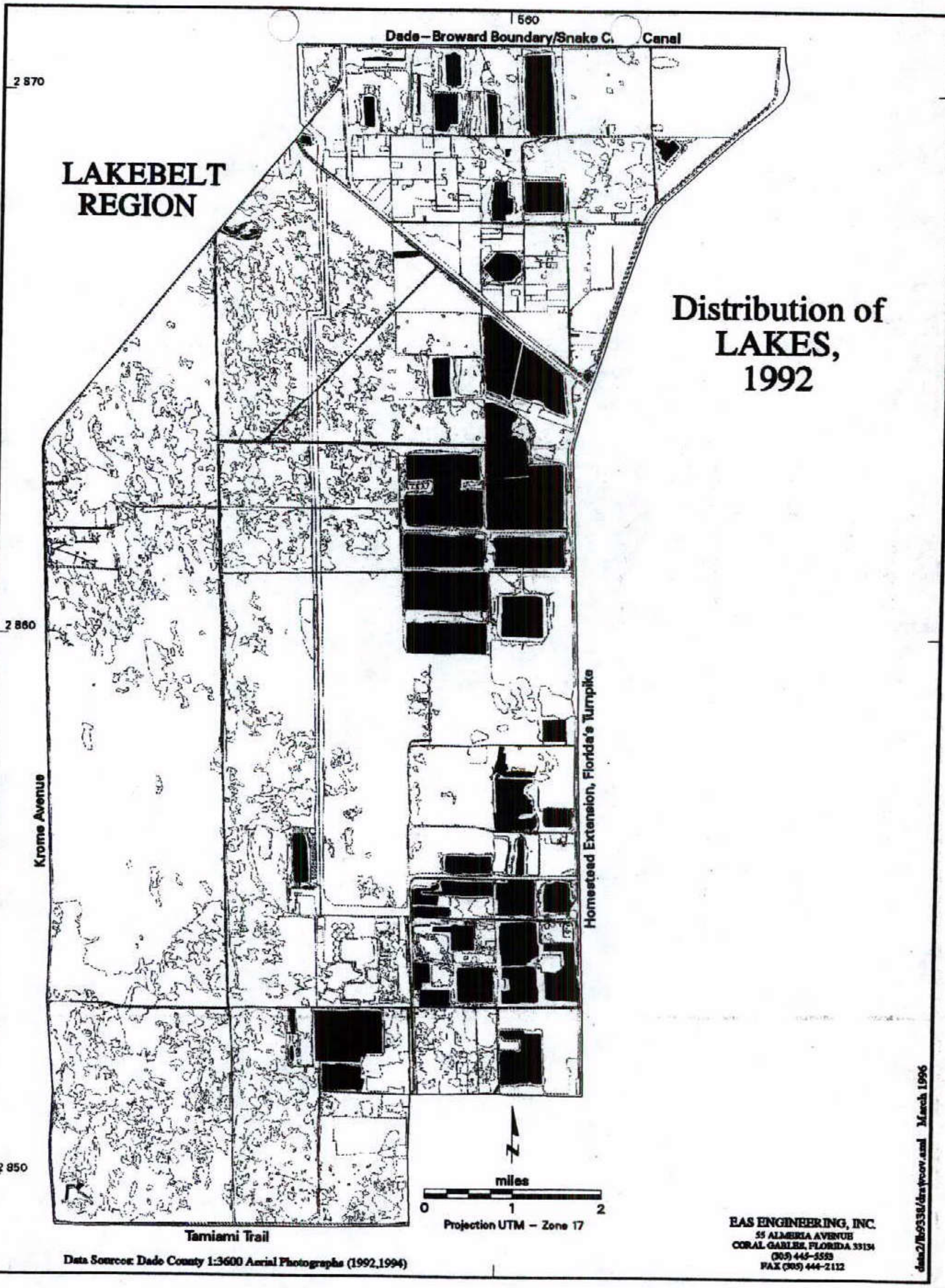
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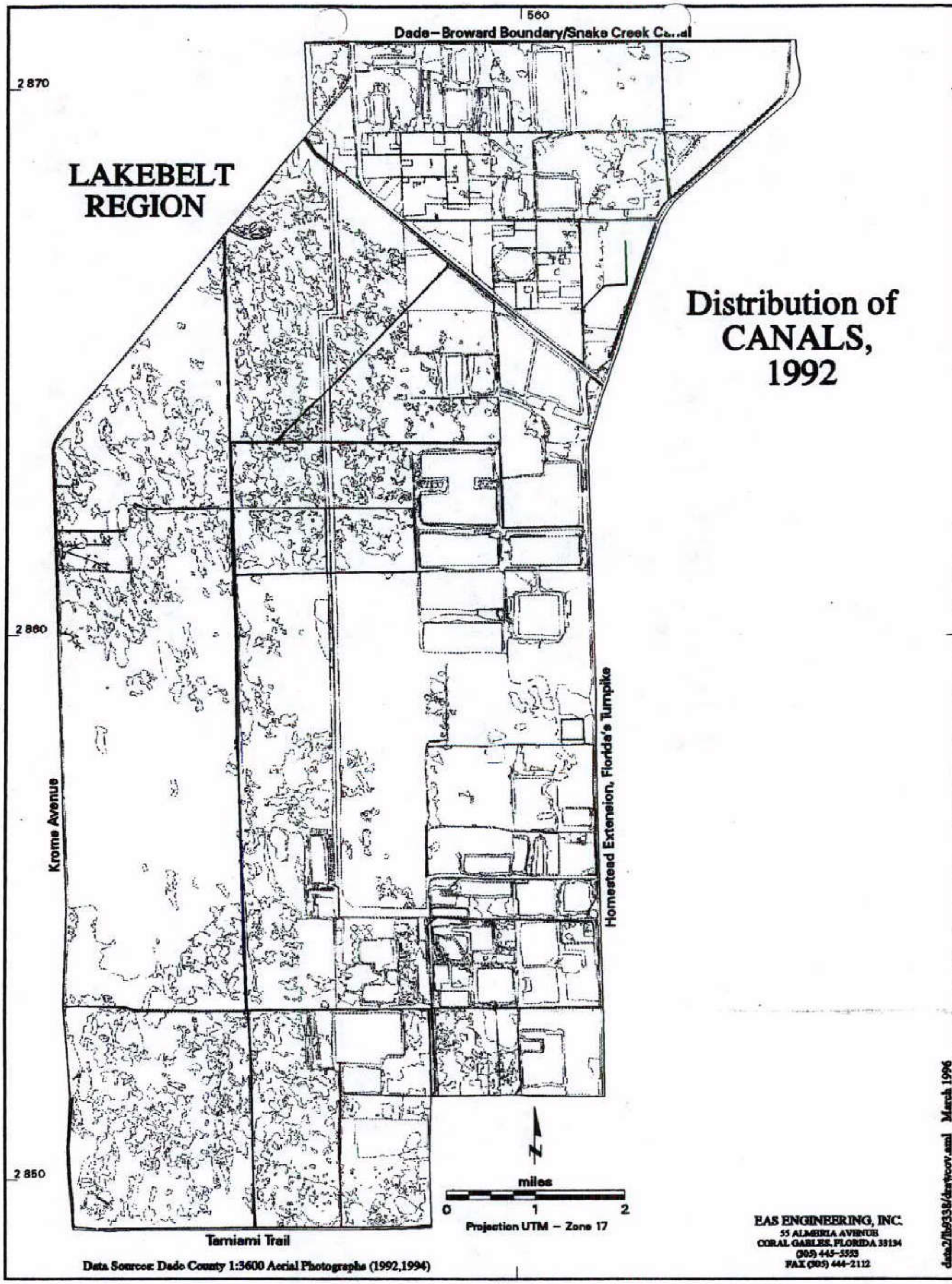
REGION
Distribution of
LAKES,
1992
560
Dade–Broward Boundary/Snake C. Canal
2 870
2 860
2 850
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
miles
0
1
2
Projection UTM – Zone 17
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996

DOC#614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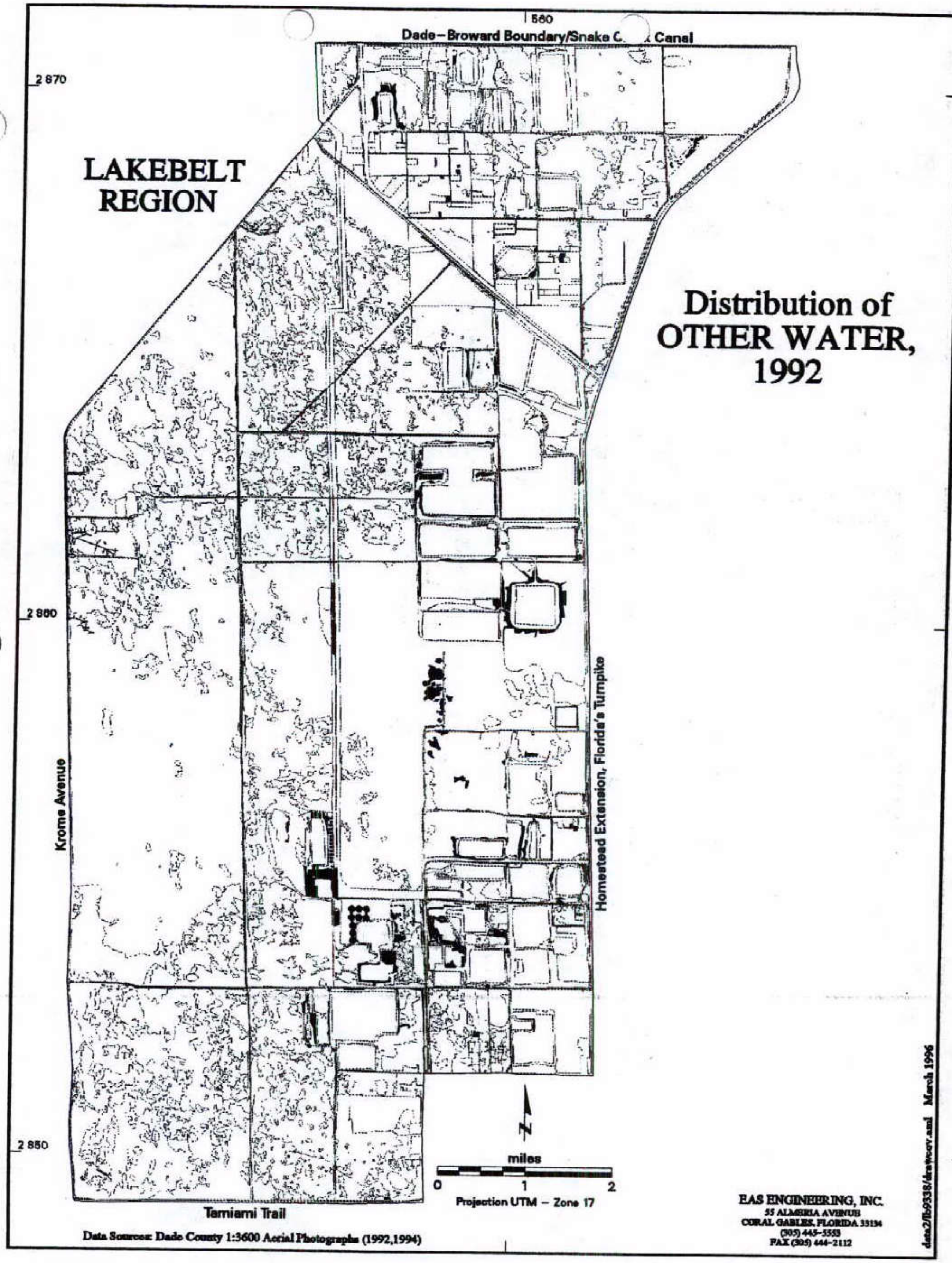
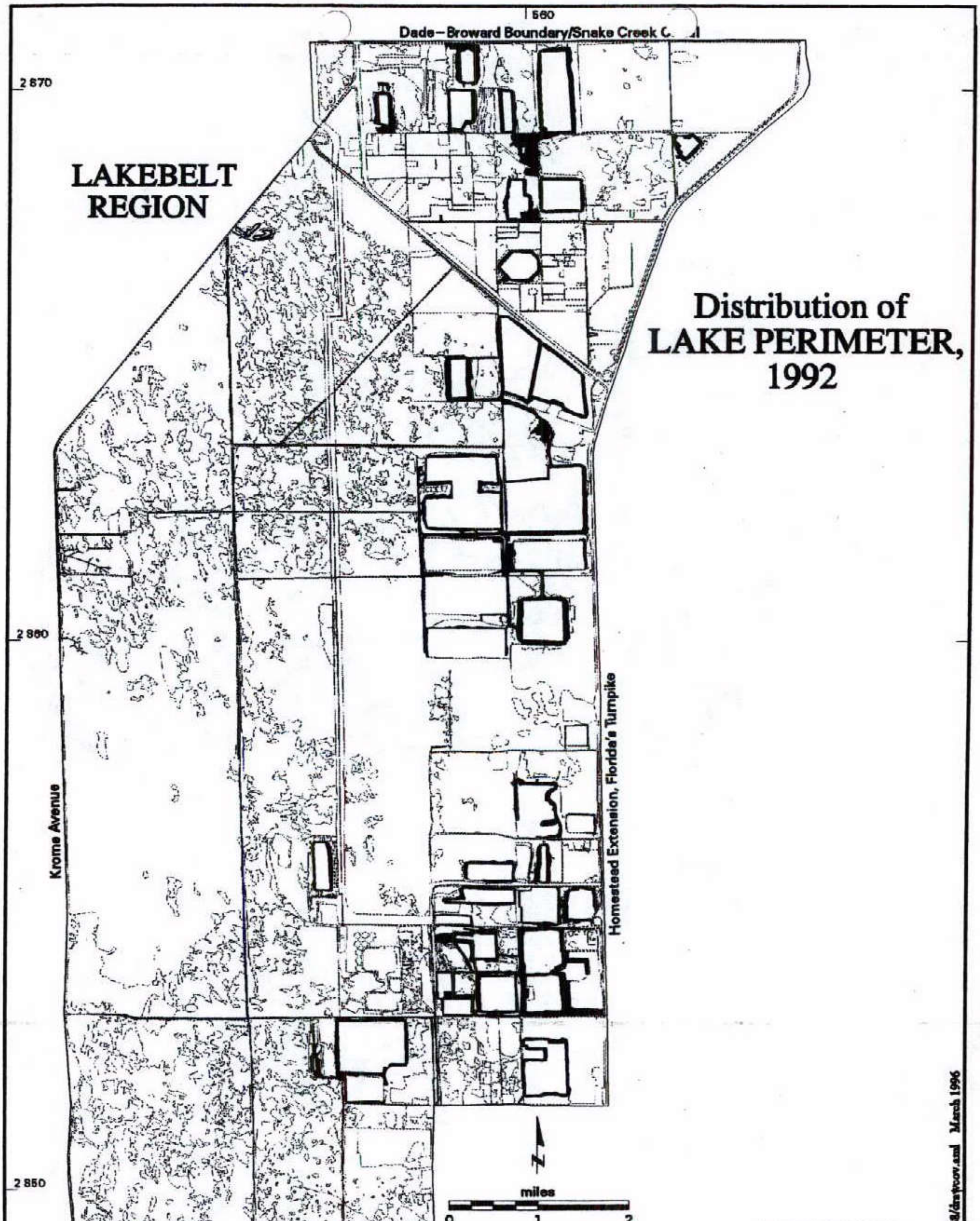
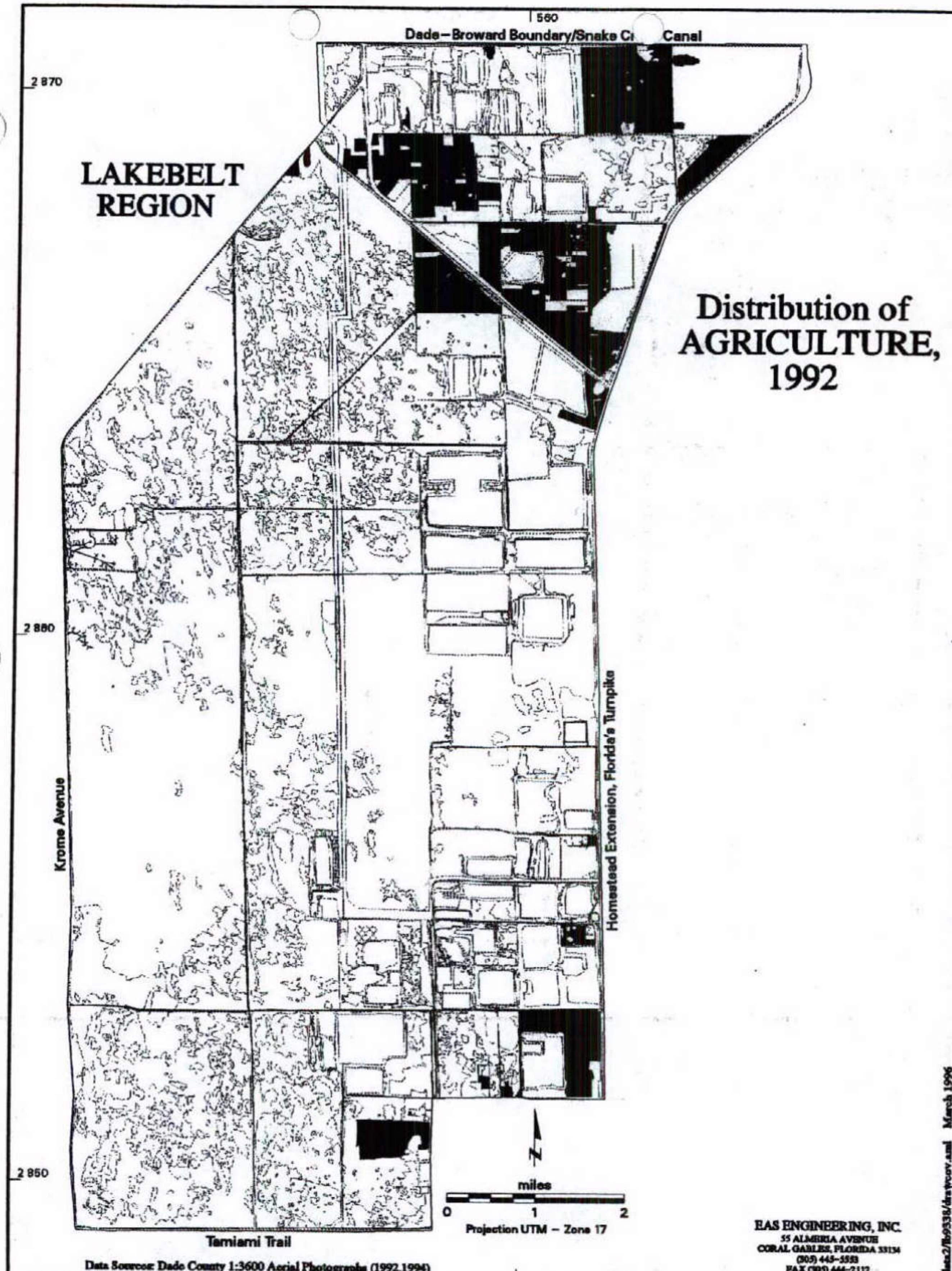
Dade–Broward Boundary/Snake Creek Canal
2 870
LAKEBELT
REGION
Distribution of
CANALS,
1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Source: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996



560
Dade-Broward Boundary/Snake C. Canal
2 870
LAKEBELT
REGION
Distribution of
OTHER WATER,
1992
2 860
Homestead Extension, Florida's Turnpike
Krome Avenue
2 850
miles
0
1
2
Projection UTM - Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996



560
Dade–Broward Boundary/Snake Creek C..al
2 870
LAKEBELT
REGION
Distribution of
LAKE PERIMETER,
1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996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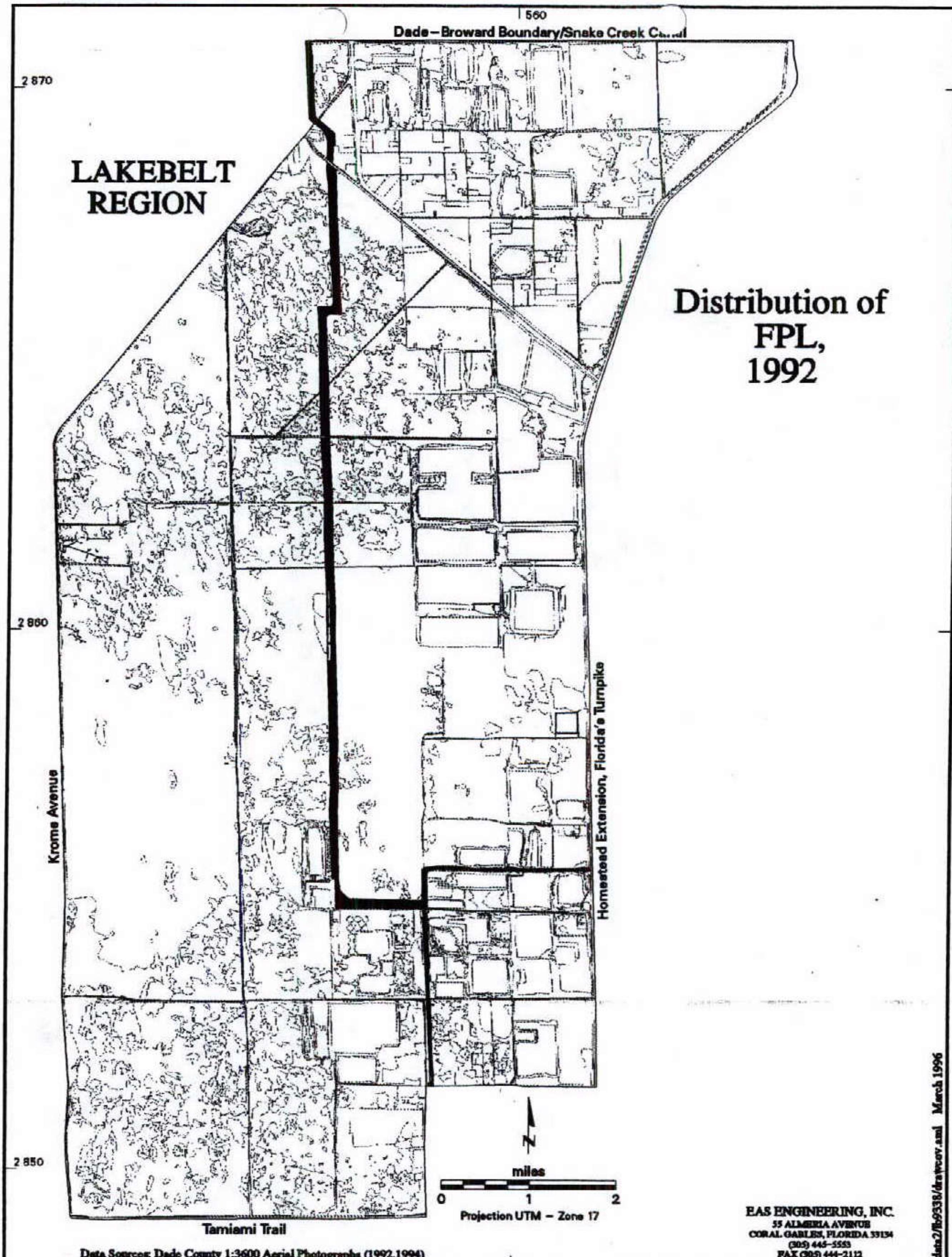
Dade–Broward Boundary/Snake Cr Canal
2 870
LAKEBELT
REGION
Distribution of
AGRICULTURE,
1992
2 880
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM – Zone 17
Tamiami Trail
Data Source: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1996

DOC#614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Dade–Broward Boundary/Snake Creek
2 870
2 860
2 850
LAKEBELT
REGION
Distribution of
FPL,
1992
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
miles
0 1 2
Projection UTM – Zone 17
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
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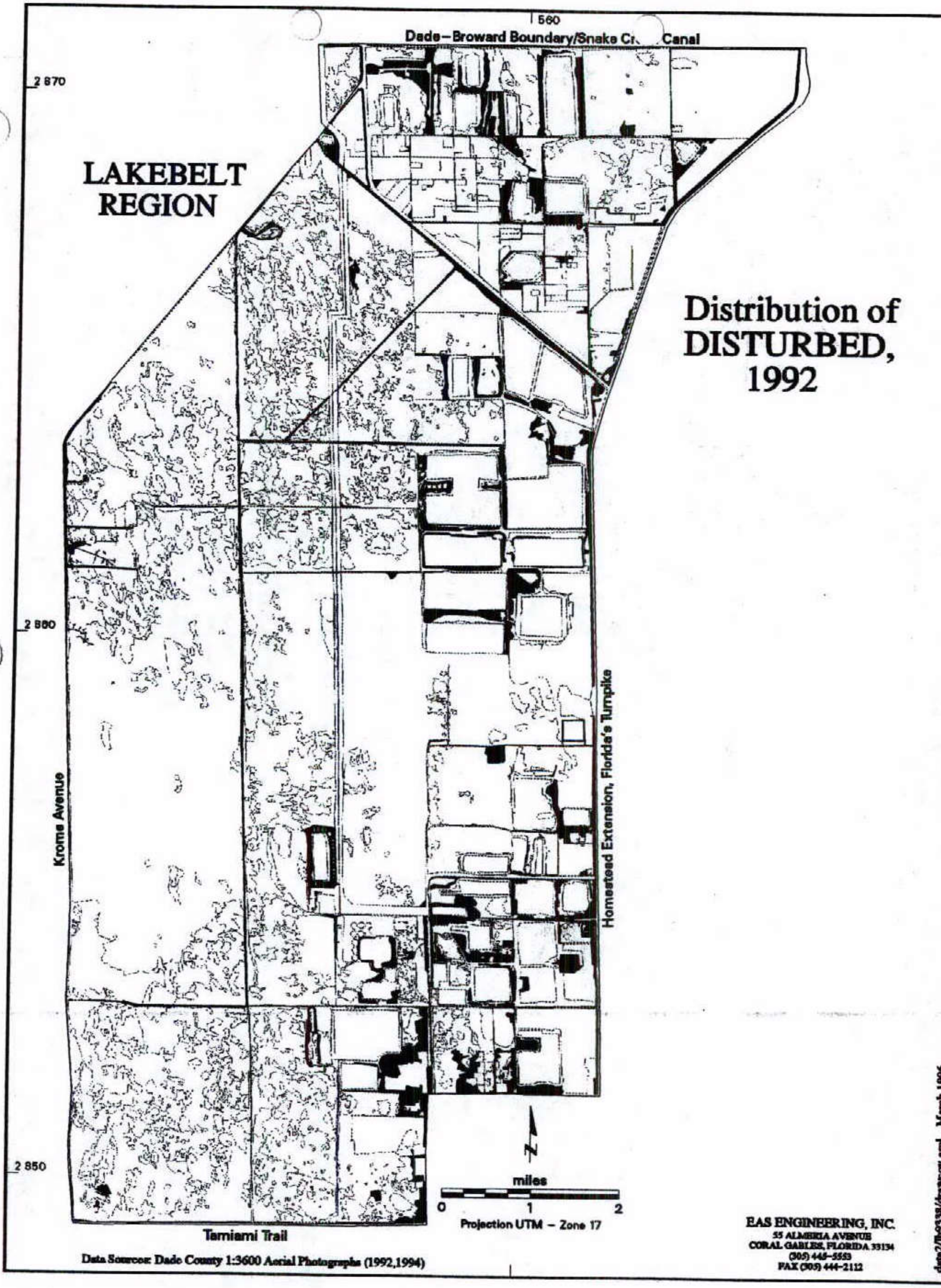
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Dade–Broward Boundary/Snake Cr
Canal
2 870
LAKEBELT REGION
Distribution of DISTURBED, 1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0 1 2
Projection UTM – Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
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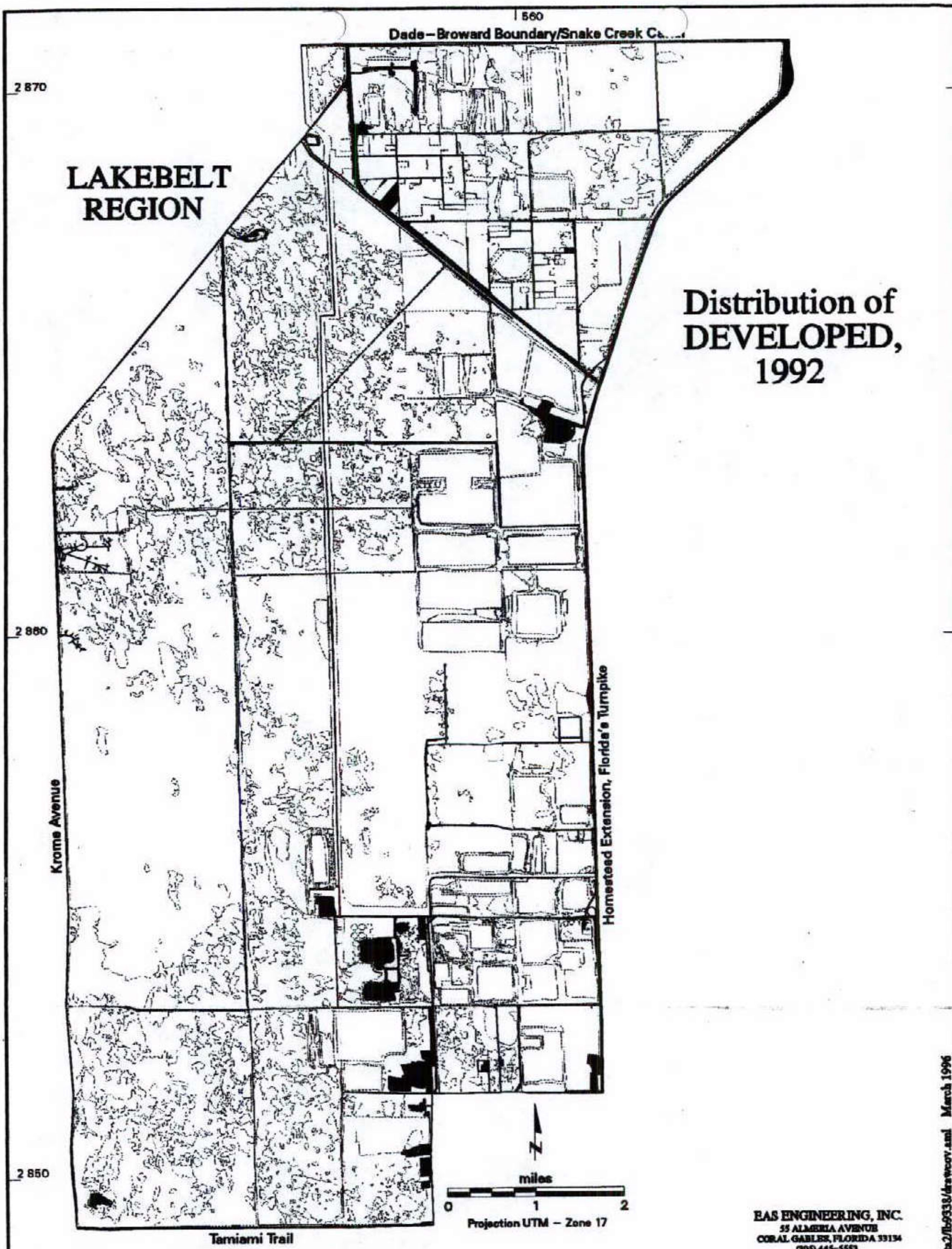

560
Dade-Broward Boundary/Snake Creek Canal
2 870
LAKEBELT REGION
Distribution of DEVELOPED, 1992
2 860
Krome Avenue
Homestead Extension, Florida's Turnpike
2 850
miles
0
1
2
Projection UTM - Zone 17
Tamiami Trail
Data Sources: Dade County 1:3600 Aerial Photographs (1992,1994)
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DOC#614

APPENDIX D

List of Plant Species Observed in the Lake Belt Region

List of Plant Species Observed within the Lakebelt Region.

Scientific Name	Common Name	Relative Abundance	Habitat Types	R & E. Status
Acrostichum danaeifolium	Leather Fern	Uncommon/OBL/OBL	w,ti	T-FDA
Aeschynomene americana	American Shy-Leaf	Uncommon/FAC/U	od	
Aeschynomene praetensis	Netted Shy-Leaf	Uncommon/OBL/OBL	p	UC-DC
Agalinus linifolia	Gerardia	Uncommon/FACW/OBL	p	
Albizia lebbeck	Mother-in-law Tongue	Rare/UPLAND/U	fd	
Aletris lutea	Colic Root	Uncommon/FACW+/FAC	p	
Alternanthera ramosissima	Alternanthera	Uncommon/UPLAND/U	fd	
Amaranthus australis	Southern Waterhemp	Uncommon/OBL/OBL	p	
Amaranthus spinosus	Spiny Pigweed	Uncommon/UPLAND/U	od	
Ambrosia artemisiifolia	Ragweed	Common/FACU/U	od	
Ammania coccinea	Scarlet Ammania	Uncommon/FACW+/OBL	p,w	
Ammania latifolia	Toothcup	Uncommon/OBL/OBL	w	
Ampelopsis arborea	Pepper Vine	Uncommon/FAC+/NS	fd,ti	
Andropogon glomeratus	Beardgrass	Common/FACW+/FACW	p,od,dm	
Andropogon virginicus	Broomsedge	Abundant/FAC-/FAC	p	
Anemia adiantifolia	Pineland Fern	Uncommon/UPLAND/U	od	T-FDA
Annona glabra	Pond Apple	Uncommon/OBL/OBL	ti	
Argemone mexicana	Mexican Poppy	Uncommon/UPLAND/U	od	
Aristida purpurascens	Wand-like Three-Awn Grass	Common/FAC/FACW	p	
Asclepias curassavica	Scarlet Milkweed	Uncommon/FAC/U	od	
Asclepias longifolia	Long-leaf Milkweed	Rare/FACW+/FACW	w,p	

Appendix A. List of Plant Species Observed within the Lakebelt Region.

Scientific Name	Common Name	Relative Abundance	Habitat Types	R & E. Status
Acrostichum danaeifolium	Leather Fern	Uncommon/OBL/OBL	w,ti	T-FDA
Aeschynomene americana	American Shy-Leaf	Uncommon/FAC/U	od	
Aeschynomene praetensis	Netted Shy-Leaf	Uncommon/OBL/OBL	p	UC-DC
Agalinus linifolia	Gerardia	Uncommon/FACW/OBL	p	
Albizia lebbeck	Mother-in-law Tongue	Rare/UPLAND/U	fd	
Aletris lutea	Colic Root	Uncommon/FACW+/FAC	p	
Alternanthera ramosissima	Alternanthera	Uncommon/UPLAND/U	fd	
Amaranthus australis	Southern Waterhemp	Uncommon/OBL/OBL	p	
Amaranthus spinosus	Spiny Pigweed	Uncommon/UPLAND/U	od	
Ambrosia artemisiifolia	Ragweed	Common/FACU/U	od	
Ammania coccinea	Scarlet Ammania	Uncommon/FACW+/OBL	p,w	
Ammania latifolia	Toothcup	Uncommon/OBL/OBL	w	
Ampelopsis arborea	Pepper Vine	Uncommon/FAC+/NS	fd,ti	
Andropogon glomeratus	Beardgrass	Common/FACW+/FACW	p,od,dm	
Andropogon virginicus	Broomsedge	Abundant/FAC-/FAC	p	
Anemia adiantifolia	Pineland Fern	Uncommon/UPLAND/U	od	T-FDA
Annona glabra	Pond Apple	Uncommon/OBL/OBL	ti	
Argemone mexicana	Mexican Poppy	Uncommon/UPLAND/U	od	
Aristida purpurascens	Wand-like Three-Awn Grass	Common/FAC/FACW	p	
Asclepias curassavica	Scarlet Milkweed	Uncommon/FAC/U	od	
Asclepias longifolia	Long-leaf Milkweed	Rare/FACW+/FACW	w,p	
Aster carolinianus	Climbing Aster	Uncommon/OBL/OBL	ti	
Aster dumosus	Bush Aster	Uncommon/FAC/FAC	p,ti,od	
Aster subulatus	Aster	Uncommon/OBL/OBL	w	

Aster tenuifolius	Aster	Common/OBL/OBL	p,w	
Baccharis angustifolia	False Willow	Uncommon/FACW+/OBL	fd	
Baccharis glomeruliflora	Groundsel Tree	Uncommon/FACW/FAC	fd,p,ti	
Baccharis halimifolia	Saltbush	Uncommon/FAC/FAC	fd,p,ti	
Bacopa caroliniana	Aromatic Figwort	Uncommon/OBL/OBL	p	
Bacopa monnieri	Matted Figwort	Common/OBL/OBL	w	
Bauhinia variegata	Orchid Tree	Rare/UPLAND/U	dv	
Berchemia scandens	Supple Jack	Rare/FACW/NS	ti	
Bischofia javanica	Bishopwood	Rare/UPLAND/U	fd,dv	
Blechnum serrulatum	Swamp Fern	Uncommon/FACW+	ti,dm	
Bletia purpurea	Pine Pink	Uncommon/FAC/U	w	T-FDA
Boehmeria cylindrica	Button Hemp	Uncommon/FACW+/OBL	p,w,ti,dm	
Borreria laevis	Borreria	Uncommon/UPLAND/U	od	
Borreria verticillata	Borreria	Abundant/UPLAND/U	p,w,od	
Brachiaria purpurascens	Paragrass	Common/FACW/FACW	od,ag	
Brassica kaber	Wild Mustard	Uncommon/UPLAND/U	od,ag	
Bryophyllum pinnatum	Live Leaf	Rare/UPLAND/U	fd	
Buchnera floridana	Bluehearts	Uncommon/FACW-/U	p	
Callicarpa americana	Beauty Berry	Uncommon/UPLAND/U	fd	
Calopogon tuberosus	Grass Pink	Uncommon/OBL/FACW	p	T-FDA;R-DC
Caperonia palustris	Marsh Caperonia	Uncommon/FACW/FACW	p,w	
Capraria biflora	Twinflower	Uncommon/UPLAND/U	od	
Cardiospermum halicacabum	Heart Seed	Uncommon/FAC/NS	fd,ti	
Carica papaya	Papaya	Uncommon/UPLAND/U	fd,ti,ag	
Cassia alata	Candlebush	Rare/FACU-/U	od,dv	
Cassia obtusifolia	Cassia	Common/UPLAND/U	od	
Cassia occidentalis	Senna	Uncommon/UPLAND/U	od	

Casuarina equisetifolia	Australian Pine	Uncommon/FACU/FAC	fd
Casuarina glauca	Beefwood	Uncommon/FAC/FAC	fd
Catharanthus roseus	Periwinkle	Uncommon/UPLAND/U	od
Celtis laevigata	Hackberry	Uncommon/FACW/FACW	ti
Cenchrus echinatus	Sandspur	Uncommon/UPLAND/U	od
Centella asiatica	Coinwort	Common/FACW/FACW	p,w
Cephalanthus occidentalis	Buttonbush	Uncommon/OBL/OBL	p,ti
Cestrum diurnum	Day-Blooming Jasmine	Common/UPLAND/FAC	fd
Chamaesyce conferta	Spurge	Uncommon/UPLAND/U	p
Chamaesyce hirta	Spurge	Uncommon/UPLAND/U	od
Chamaesyce hypericifolia	Tropical Broomspurge	Common/FACU/U	od
Chamaesyce hyssopifolia	Hyssop-leaf Broomspurge	Uncommon/FAC/U	od
Chenopodium ambrosioides	Mexican Tea	Common/FACU/U	od,ag
Chrysobalanus icaco	Coco Plum	Uncommon/FACW/FACW	ti
Cirsium horridulum	Purple Thistle	Uncommon/FAC+/U	p
Cissus sicyoides	Possum Vine	Uncommon/UPLAND/NS	ti,fd
Cladium jamaicense	Sawgrass	Abundant/OBL/OBL	p,dm,w
Commelina diffusa	Dayflower	Common/FACW/FACW	w,ag
Conoclinium coelestinum	Mistflower	Uncommon/FAC/FAC	p,dm
Conyza canadensis	Dwarf Horseweed	Uncommon/FACU/U	od
Corchorus siliquosus	Jute	Rare/UPLAND/U	od,ag
Crinum americanum	String Lily	Uncommon/OBL/OBL	p,w
Crotalaria spectabilis	Rattlebox	Uncommon/UPLAND/U	od
Cuphea carthagenensis	Columbia Waxweed	Uncommon/FACW/FAC	p,w
Cynodon dactylon	Bermuda Grass	Common/FACU/U	ag,od
Cyperus distinctus	Marshland Flatsedge	Uncommon/FACW/OBL	w
Cyperus flavescens	Yellow Cyperus	Uncommon/OBL/OBL	w
Cyperus haspan	Sheathed Cyperus	Uncommon/OBL/OBL	p,w
Cyperus iria	Rice Flatsedge	Uncommon/FACW/FACW	w

Cyperus ligularis	Cyperus	Uncommon/FACW/FACW	od,w
Cyperus odoratus	Fragrant Flatsedge	Uncommon/FACW/FACW	w
Cyperus polystachyos	Many-spike Flatsedge	Uncommon/FACW/FACW	w
Cyperus rotundus	Nutgrass	Common/FAC-/FAC	od,ag
Cyperus surinamensis	Tropical Flatsedge	Uncommon/FACW/FACW	w
Dactyloctenium aegyptium	Crowsfoot Grass	Common/UPLAND/U	od
Desmodium incanum	Beggars Ticks	Uncommon/UPLAND/U	od,ag
Dichanthelium erectifolium	Erect Panicum	Uncommon/OBL/OBL	p
Dichromena colorata	White Top	Uncommon/FACW/FACW	p,w
Diodia virginiana	Buttonweed	Uncommon/FACW-/FACW	w
Echinochloa colonum	Jungle Rice	Common/FACW/FACW	od,ag
Echinochloa crus-galli	Barnyard Grass	Uncommon/FACW/FACW	w
Eclipta alba	False Verbesina	Common/FACW-/FACW	w
Eleocharis atropurpurea	Purple Spikerush	Common/OBL/OBL	w
Eleocharis cellulosa	Spikerush	Uncommon/OBL/OBL	p,w
Eleocharis interstincta	Jointed Spikerush	Common/OBL/OBL	w
Eleocharis vivipara	Viviparous Spikerush	Uncommon/OBL/OBL	w
Eleusine indica	Indian Grass	Common/FACU/U	od
Emilia fosbergi	Tasselflower	Uncommon/UPLAND/U	od
Eragrostis ciliaris	Gophertail Lovegrass	Uncommon/FACU/FAC	od
Eragrostis elliottii	Elliott's Lovegrass	Common/FACW/FAC	p
Erianthus giganteus	Sugarcane Plumegrass	Common/FACW/FACW	p
Erechtites hieraciifolia	American Burn	Uncommon/FAC-/FAC	fd,od
Erigeron quercifolius	Oak-leaved Fleabane	Common/FAC+/FAC	p
Eriocaulon compressum	Compressed Pipewort	Rare/OBL/OBL	p
Eugenia axillaris	White Stopper	Rare/UPLAND/U	fd,ti
Eugenia uniflora	Surinam Cherry	Rare/UPLAND/U	fd,dv

Eulophia alta	Wild Coco	Uncommon/FACW/FACW	w	T-FDA; R-DC
Eupatorium capillifolium	Dog Fennel	Common/FACU/FAC	od	
Eupatorium leptophyllum	Fennel	Common/FAC+/OBL	p	
Eupatorium serotinum	Fennel	Uncommon/FAC/FAC	fd	
Eustachys glauca	Finger Grass	Uncommon/FACW/FACW	p	
Eustachys petraea	Finger Grass	Uncommon/FACW/U	od	
Ficus aurea	Strangler Fig	Uncommon/FACW/FAC	fd,ti	
Ficus citrifolia	Wild Banyan Tree	Uncommon/FAC/U	fd	
Fimbristylis spathacea	Fringe Rush	Common/FACW+/FAC	w	
Flaveria linearis	Yellowtop	Common/FACW/FACW	p,w	
Flaveria trinervia	Yellowtop	Uncommon/UPLAND/U	od	
Fuirena breviseta	Umbrella Grass	Uncommon/OBL/OBL	w,p	
Fuirena scirpoidea	Rush Fuirena	Uncommon/OBL/OBL	p	
Galium obtusum	Bedstraw	Uncommon/FACW-/U	w	
Gaura angustifolia	Southern Gaura	Uncommon/UPLAND/U	od	
Geranium carolinianum	Cranesbill	Uncommon/UPLAND/U	od	
Habenaria quinqueseta	Long-Horned Habenaria	Uncommon/FACW/FACW	fd	T-FDA
Heliotropium angiospermum	Heliotrope	Uncommon/UPLAND/U	fd	
Heliotropium polyphyllum	Pineland Heliotrope	Uncommon/FAC/FACW	p	
Hibiscus esculentus	Okra	Uncommon/UPLAND/U	ag	
Hydrocotyle umbellata	Marsh Pennywort	Uncommon/OBL/FACW	w,p,dm	
Hydrolea corymbosa	Skyflower	Uncommon/OBL/OBL	w,p	
Hymenocallis latifolia	Spider Lily	Uncommon/FACW/OBL	p	
Hypericum brachyphyllum	St. John's Wort	Uncommon/FACW/FACW	p	
Hypericum fasciculatum	St. Andrews Cross	Uncommon/FACW+/OBL	p	
Hyptis alata	Musky Mint	Uncommon/OBL/FACW	p	UC-DC

Ilex cassine	Dahoon Holly	Uncommon/FACW/OBL	ti,p,dm	CE-FDA
Indigofera endecaphylla	Indigo	Uncommon/UPLAND/U	od	
Indigofera suffruticosa	Anil Indigo	Rare/FACU/U	od	
Ipomoea alba	Moon Vine	Common/FAC/NS	fd,ti	
Ipomoea indica	Common Morning Glory	Common/FAC/NS	fd,ti	
Ipomoea sagittata	Glades Morning Glory	Common/FACW/NS	p	
Ipomoea trichocarpa	Little Pink Morning Glory	Common/FACU/NS	od	
Iresine canescens	Iresine	Uncommon/UPLAND/U	od	
Iresine rhizomatosa	Rootstock Bloodleaf	Uncommon/FACW-/U	ti	
Iris hexagona	Prairie Iris	Uncommon/OBL/OBL	p	
Iva microcephala	Marshelder	Common/FACW/FACW	p	
Juncus marginatus	Grass-leaved Rush	Uncommon/FACW/FACW	w	
Juncus megacephalus	Large-Headed Rush	Common/OBL/OBL	w,p	
Justicia ovata	Water Willow	Uncommon/OBL/OBL	p	
Kosteletzkya virginica	Saltmarsh Mallow	Uncommon/OBL/OBL	p,w	
Lantana camara	Lantana	Uncommon/FACU/U	fd	
Lantana involucrata	Bush Lantana	Rare/UPLAND/U	fd	
Lasiacus divaricata	Wild Bamboo	Rare/UPLAND/U	ti	
Lepidium virginicum	Pepper Grass	Uncommon/FACU/U	od	
Leersia hexandra	Southern Cutgrass	Uncommon/OBL/OBL	p	
Leptochloa fascicularis	Bearded Sprangletop	Uncommon/FACW+	w	
Leucaena leucocephala	Lead Tree	Uncommon/FACU+/U	fd	
Lindernia anagallida	False Pimpernel	Uncommon/FACW+	p,w	
Linum medium var. texanum	Yellow Flax	Common/FAC/FAC	p	
Ludwigia alata	Wing-Stemmed Ludwigia	Uncommon/OBL/OBL	w	
Ludwigia curtissii	Curtiss Waterprimrose	Uncommon/FACW+/OBL	p,w	

Ludwigia microcarpa	Small-Fruited Primrose Willow	Common/OBL/OBL	p,w	
Ludwigia octovalvis	Shrubby Waterprimrose	Uncommon/OBL/OBL	w	
Ludwigia peruviana	Primrose Willow	Uncommon/OBL/OBL	w	
Ludwigia repens	Floating Ludwigia	Common/OBL/OBL	w	
Lycopersicon lycopersicum	Tomato	Rare/UPLAND/U	ag	
Lythrum alatum	Winged Loosestrife	Uncommon/FACW+/OBL	w	
Macroptilium lathyroides	Common Bean	Uncommon/FACU/U	od	
Magnolia virginiana	Sweet Bay	Rare/FACW+/OBL	ti	
Mangifera indica	Mango	Rare/UPLAND/U	dv,ag	
Manisuris rugosa	Jointgrass	Uncommon/OBL/FACW	p	
Mecardonia acuminata	Purple Mecardonia	Uncommon/FACW/FACW	w	
Medicago lupulina	Black Medic	Common/FACU/U	od,ag	
Melaleuca quinquenervia	Cajeput	Abundant/FAC/FAC	p,dm,fd,dv	
Melia azerdach	Chinaberry	Rare/UPLAND/U	fd,dv	
Melilotus alba	Sweet Clover	Uncommon/FACU-/U	od.ag	
Merremia umbellata	Yellow Merremia	Uncommon/UPLAND/NS	fd	
Melothria pendula	Creeping Cucumber	Common/FACW-/NS	fd,ti	
Metopium toxiferum	Poisonwood	Uncommon/FAC-/FAC	fd	
Mikania scandens	Climbing Hempvine	Common/FACW+/NS	p,dm	
Mitreola petiolata	Stalked Mitrewort	Uncommon/FACW+/FACW	p,w	
Momordica charantia	Wild Balsam Apple	Uncommon/UPLAND/NS	od	
Muhlenbergia capillaris	Muhly	Uncommon/FACU/OBL	p	
Musa paradisiaca	Banana	Rare/UPLAND/U	dv,ag	
Myrica cerifera	Wax Myrtle	Common/FAC+/FAC	p,ti,fd,dm	
Myrsine floridana	Myrsine	Common/FAC/FAC	fd	
Nephrolepis biserrata	Boston Fern	Uncommon/FACW-/FAC	ti,fd	T-FDA; R-DC
Nephrolepis exaltata	Boston Fern	Uncommon/UPLAND/FAC	ti,fd	

Neyraudia reynaudiana	Silk Grass	Common/FAC/FAC	od	
Nuphar luteum	Spatterdock	Common/OBL/OBL	w	
Nymphaea odorata	White Water Lily	Uncommon/OBL/OBL	p	
Nymphoides aquatica	Floating Hearts	Uncommon/OBL/OBL	p	
Oecoclades maculata		Uncommon/UPLAND/U	fd,ti	
Oplismenus setarius	Oplismenus	Uncommon/FACU+/FAC	fd	
Osmunda regalis	Royal Fern	Uncommon/OBL/OBL	ti,dm,w	CEFDA
Oxalis stricta	Yellow Oxalis	Uncommon/UPLAND/U	od	
Oxypolis filiformis	Water Dropwort	Uncommon/FACW+/OBL	p	
Panicum dichotomiflorum	Fall Panicum	Uncommon/FACW/FACW	w	
Panicum hemitomon	Maidencane	Uncommon/OBL/OBL	w,p	
Panicum repens	Torpedo Grass	Uncommon/FACW-/FACW	w	
Panicum rigidulum	Redtop Panicum	Uncommon/FACW/FACW	p,w	
Panicum tenerum	Bluejoint Panicum	Common/FACW/OBL	p	
Parietaria floridana	Pellitory	Common/FAC-/FACW	fd	
Parthenium hysterophorus	Santa Maria	Common/UPLAND/U	od	
Parthenocissus quinquefolia	Virginia Creeper	Uncommon/FAC/NS	fd	
Paspalidium geminatum	Water Panicum	Uncommon/OBL/OBL	p	
Paspalum conjugatum	Sour Paspalum	Uncommon/FAC/FAC	od	
Paspalum setaceum	Thin Paspalum	Uncommon/FAC/FAC	od	
Paspalum urvillei	Vasey Grass	Common/FAC/FAC	od	
Passiflora suberosa	Passionflower	Uncommon/UPLAND/NS	p,fd	
Pectis leptocephala	Lemon Pectis	Uncommon/UPLAND/U	od	
Peltandra virginica	Arrow Arum	Uncommon/OBL/OBL	p	
Pennisetum purpureum	Napier Grass	Common/FACU+/FAC	od,ag	
Persea americana	Avocado	Rare/UPLAND/U	dv,ag	
Persea palustris	Red Bay	Uncommon/FACW/OBL	ti,fd,p,dm	

Phlebodium aureum	Golden Polypody	Uncommon/UPLAND/U	ti,fd	T-FDA
Phragmites australis	Common Reed	Common/FACW/OBL	w	
Phyla nodiflora	Creeping Charlie	Common/FACW/FAC	p,w,ag	
Phyla stoechadifolia	Frog Fruit	Common/FACW+/FAC	w	
Phyllanthus amarus	Phyllanthus	Uncommon/UPLAND/U	od	
Phyllanthus caroliniensis	Carolina Leaf-flower	Uncommon/FAC+FACW	p	
Physalis angulata	Ground Cherry	Uncommon/UPLAND/U	od	
Physalis angustifolia	Ground Cherry	Uncommon/UPLAND/U	p	
Physalis viscosa	Ground Cherry	Uncommon/UPLAND/U	p	
Phytolacca americana	Pokeberry	Uncommon/FACU+/U	fd	
Pilea microphylla	Artillery Fern	Uncommon/UPLAND/U	fd	
Piper methysticum	Kava	Rare/UPLAND/U	dv	
Piriqueta caroliniana	Piriqueta	Rare/UPLAND/U	p	
Plantago major	Plaintain	Uncommon/FAC+/U	od	
Pluchea odorata	Marsh Fleabane	Uncommon/FACW/FACW	w	
Pluchea rosea	Marsh Fleabane	Common/FACW/FACW	p,w	
Pluchea symphytifolia	Bushy Fleabane	Common/UPLAND/FACW	fd,od	
Poinsettia cyathophora	Wild Poinsettia	Uncommon/UPLAND/U	od	
Polygala balduinii	White Bachelor Button	Uncommon/OBL/FACW	p	
Polygala grandiflora	Milkwort	Uncommon/UPLAND/FACW	p	
Polygonum hydropiperoides	Swamp Knotweed	Uncommon/OBL/OBL	w	
Polygonum pennsylvanicum	Pennsylvania Smartweed	Uncommon/FACW/OBL	od,ag	
Polypodium polypodioides	Resurrection Fern	Uncommon/UPLAND/U	fd	
Polypremum procumbens	Polypremum	Uncommon/UPLAND/FAC	od	
Portulaca oleracea	Purslane	Uncommon/FACU/U	od	
Pontederia cordata	Pickerelweed	Uncommon/OBL/OBL	p,w	
Potamogeton illinoensis	Pondweed	Uncommon/OBL/NS	p,w	
Proserpinaca palustris	Swamp Mermaid	Common/OBL/OBL	p	
Psidium guajava	Guava	Uncommon/FACU/U	fd	

Psilocarya nitens	Bald Rush	Rare/OBL/OBL	p,w	
Psilotum nudum	Whisk Fern	Uncommon/FACU+/U	fd	T-FDA; R-DC
Psychotria nervosa	Wild Coffee	Rare/UPLAND/FAC	fd	
Psychotria sulzneri	Soft-leaved Wild Coffee	Uncommon/UPLAND/FAC	ti,fd	
Pteridium aquilinum	Bracken Fern	Uncommon/FACU/U	od	
Pteris longifolia	Ladder Brake Fern	Uncommon/UPLAND/U	fd	T-FDA
Pteris vittata	Brake Fern	Uncommon/UPLAND/U	fd	T-FDA
Rhoeo spathacea	Oyster Plant	Rare/UPLAND/U	dv,fd	
Rhynchelytrum repens	Natal Grass	Uncommon/UPLAND/U	od	
Rhynchospora divergens	Spreading Beakrush	Abundant/OBL/OBL	p	
Rhynchospora inundata	Water Rhynchospora	Uncommon/OBL/OBL	p	
Rhynchospora microcarpa	Littleseed Beakrush	Abundant/FACW+/OBL	p	
Rhynchospora tracyi	Tracy's Horned Rush	Abundant/OBL/OBL	p	
Richardia scabra	Richardia	Uncommon/UPLAND/U	od	
Ricinus communis	Castor Bean	Abundant/FACU/U	od,fd	
Rivina humilis	Bloodberry	Uncommon/UPLAND/U	ti,fd	
Rorippa palustris	Yellow Cress	Abundant/OBL/OBL	od,ag	
Rorippa teres	Yellow Cress	Abundant/FACW/OBL	od,ag	
Roystonea cf. regia	Cuban Royal Palm	Uncommon/FACW/FACW	fd,dm	
Sabal palmetto	Cabbage Palm	Uncommon/FAC/FAC	fd,ti,dm	
Sabatia grandiflora	Marsh Pink	Uncommon/FACW+/FACW	p,w	
Sagittaria lancifolia	Giant Arrowhead	Uncommon/OBL/OBL	p,w	
Salix caroliniana	Coastal Plain Willow	Common/OBL/OBL	w	
Salvinia rotundifolia	Salvinia	Uncommon/OBL/NS	w	
Sambucus canadensis	Elderberry	Uncommon/FACW-/FAC	od,ti,fd	
Samolus ebracteatus	Water Pimpernel	Common/OBL/OBL	p	
Sanseviera thyrsiflora	Snake Plant	Rare/UPLAND/U	fd,dv	

Sarcostemma clausum	White Tuber Vine	Common/FACW/NS	ti,fd
Saururus cernuus	Lizard's Tail	Uncommon/OBL/OBL	ti,w
Schinus terebinthifolius	Brazilian Pepper	Uncommon/FAC/FAC	fd,ti
Schizachyrium gracile	Narrow Beardgrass	Uncommon/UPLAND/FAC	od
Schizachyrium rhizomatum	Narrow Beardgrass	Abundant/FACW-/FAC	p
Schizachyrium semiberbe	Schizachyrium	Uncommon/UPLAND/FAC	od
Scleria reticularis	Netted Nutrush	Common/OBL/FACW	p
Scleria verticillata	Low Nut Grass	Common/OBL/FACW	p
Scirpus validus	Soft-Stem Bulrush	Uncommon/OBL/OBL	p,w
Scoparia dulcis	Sweet Broom	Uncommon/FAC/U	od
Senecio glabellus	Butterwort	FACW+/OBL	w,ag
Sesbania exaltata	Sesbania	Rare/FACW-/FAC	w,ag
Setaria geniculata	Knotroot Bristlegrass	Common/FAC/FAC	p,w
Setaria magna	Giant Foxtail Grass	Rare/FACW+/FACW	od
Setcreasea pallida	Purple Queen	Rare/UPLAND/U	dv
Sida acuta	Wax Mallow	Common/UPLAND/U	od
Sida rhombifolia	Wax Mallow	Common/UPLAND/U	od
Sida rubromarginata	Wax Mallow	Common/UPLAND/U	od
Sisyrinchium atlanticum	Blue-Eyed Grass	Uncommon/FACW-/FACW	p,w
Smilax bona-nox	Greenbrier	Uncommon/FAC/NS	fd,ti
Smilax laurifolia	Bamboo Vine	Uncommon/FACW+/NS	ti
Solanum americanum	Common Nightshade	Uncommon/FACU+/U	od
Solanum erianthum	Potato Tree	Uncommon/UPLAND/FAC	fd
Solanum viarum	Tropical Soda Apple	Uncommon/UPLAND/U	ag
Solidago leavenworthii	Goldenrod	Uncommon/FAC+/FACW	p,w
Solidago stricta	Willowleaf Goldenrod	Common/OBL/FACW	p
Sonchus asper	Sow's Thistle	Common/UPLAND/U	od
Sonchus oleraceus	Sow's Thistle	Common/UPLAND/U	od
Sorghum halapense	Johnson Grass	Common/UPLAND/U	od,ag

Spartina bakeri	Slender Cordgrass	Uncommon/FACW+/FACW	p	
Spigelia anthelmia	West Indies Pinkroot	Uncommon/UPLAND/U	od	
Spiranthes praecox	Grass-Leaved Ladies Tresses	Rare/FACW/FACW	p	T-FDA; R-DC
Sporobolus indicus	Dropseed	Common/FACU+/U	od	
Stachytarpheta jamaicensis	Blue Porterweed	Uncommon/FACU/U	od	
Stenotaphrum secundatum	St. Augustines Grass	Uncommon/FAC/U	od,dv	
Stylosanthes hamata	Pencil Flower	Uncommon/UPLAND/U	od	
Swietenia mahagoni	West Indies Mahogany	Rare/UPLAND/U	fd,dv	
Syngonium podophyllum	Syngonium	Rare/UPLAND/U	fd,dv	
Syzygium jambos	Rose Apple	Rare/UPLAND/U	fd,dv	
Teucrium canadense	Germander	Uncommon/FACW-/FACW	p,w	
Thelypteris interrupta	Shield Fern	Uncommon/FAC+/FACW	p,ti	T-FDA;UC-DC
Thelypteris kunthii	Shield Fern	Uncommon/FACW/FACW	p,ti,w	T-FDA;UC-DC
Thelypteris ovata	Shield Fern	Uncommon/UPLAND/FACW	fd	T-FDA
Toxicodendron radicans	Poison Ivy	Uncommon/FAC/NS	fd,ti	
Trema micrantha	West Indies Trema	Uncommon/UPLAND/FAC	fd	
Tridax procumbens	Tridax	Uncommon/UPLAND/U	od	
Typha dominigensis	Southern Cattail	Uncommon/OBL/OBL	w,p	
Urena lobata	Caesar Weed	Uncommon/UPLAND/FAC	od	
Utricularia biflora	Bladderwort	Uncommon/OBL/OBL	p	
Utricularia cornuta	Horned Bladderwort	Uncommon/OBL/OBL	p	
Utricularia fibrosa	Fibrous Bladderwort	Uncommon/OBL/OBL	p	
Utricularia foliosa	Floating Bladderwort	Abundant/OBL/OBL	w	
Utricularia purpurea	Purple Bladderwort	Common/OBL/OBL	w	
Verbena scabra	Harsh Vervain	Uncommon/FACW/FACW	w	
Vigna luteola	Cowpea	Uncommon/FACW/NS	w,od	

Vitis rotundifolia	Muscadine Grape	Uncommon/FAC/NS	fd,ti
Vitis shuttleworthii	Calusa Grape	Uncommon/FAC/NS	fd,ti
Vitis vulpina	Frost Grape	Uncommon/FAC+/NS	fd,ti
Waltheria indica	Waltheria	Common/UPLAND/U	p,od
Wedelia trilobata	Wedelia	Rare/FACU/FAC	fd,od,dv
Xyris jupicai	Tropical Yelloweye Grass	Uncommon/OBL/FACW	p
Yucca aloifolia	Spanish Bayonet	Rare/FACU-/U	fd,dv
Zebrina pendula	Wandering Jew	Uncommon/UPLAND/U	fd,dv
Zeuxine strateumatica	Zeuxine	Uncommon/UPLAND/U	od
Zoysia japonica	Korean Grass	Uncommon/UPLAND/U	od,dv

494

DOC#614

Notes for Plant Species Table:

1. Identifications and taxonomic details are from the following sources:

a. Long, R.W. and O. Lakela. 1971. A Flora of Tropical Florida. Univ. of Miami Press, Coral Gables. 962 pp.

b. Godfrey, R.K. and J.W. Wooten. 1979. Aquatic and Wetland Plants of the Southeastern United States: Monocotyledons. Univ. of Georgia Press, Athens. 712 pp.

c. Godfrey, R.K. and J.W. Wooten. 1981. Aquatic and Wetland Plants of the Southeastern United States: Dicotyledons. Univ. of Georgia Press, Athens. 933 pp.

d. Lellinger, D.B. 1985. A Field Manual of the Ferns & Fern Allies of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 389 pp.

e. Correll D.S. and H.B. Correll. 1982. Flora of the Bahama Archipelago. J. Cramer, Vaduz. 1692 pp.

f. Dressler, R.L., D.W. Hall, K.D. Perkins & N.H. Williams. 1987. Identification Manual for Wetland Plant Species of Florida. IFAS, Gainesville. 297 pp.

g. U.S. Army Corps of Engineers Jacksonville District: Regulatory Division. 1988. A Guide to Selected Florida Wetland Plants and Communities. U.S. Army Corps of Engineers Jacksonville District. 319 pp.

h. Wunderlin, R.P. 1982. Guide to the Vascular Plants of Central Florida. University Presses of Florida, Tampa. 472 pp.

I. Hall, D.W. 1978. The Grasses of Florida. UMI Dissertation Services, Ann Arbor, MI. 498 pp.

2. Relative Abundance Categories:

Abundant: very large numbers of individuals of a species, widespread throughout the habitat type; species dominant;

Common: large numbers of individuals of a species, throughout the habitat type;

Uncommon: moderate number of individuals of a species localized in a habitat type, or a few individuals of a species widespread throughout the habitat type;

Rare: only a few individuals of a species anywhere in the habitat type.

3. Federal Wetland Status is from Reed, P.B. 1988. National List of Plant Species That Occur in Wetlands: Southeast (Area 2). U.S. Fish Wildl. Serv. Biol. Rep. 88(26.2): 124 pp. The categories are defined as follows:

OBL-Obligate Wetland Plants: plants that occur almost always (estimated probability >99%) under natural conditions in wetlands.

FACW-Facultative Wetland Plants: plants that usually occur in wetlands (estimated probability 67 to 99%), but occasionally found in nonwetlands.

FAC-Facultative Plants: plants equally likely to occur in wetlands or nonwetlands (estimated probability 34 to 66%).

FACU-Facultative Upland Plants: plants that usually occur in nonwetlands (estimated probability 67% to 99%), but occasionally found in wetlands (estimated probability 1% to 33%).

UPLAND-Obligate Upland Plants: Plants that occur in wetlands in another region, but occur almost always (estimated probability >99%) under natural conditions in nonwetlands in the region specified. If a species does not occur in wetlands in any region, it is not on the National List.

+-denotes that the species generally has a greater estimated probability of occurring in wetlands than species having the general indicator status, but a lesser estimated probability of occurring in wetlands than those having the next highest general indicator. For example, a species with an indicator status of FAC+ occurs in wetlands more often than a species designated as FAC, but less often than a species having a FACW status.

--denotes that the species generally has a lesser estimated probability of occurring in wetlands than species having the general indicator status, but a greater estimated probability of occurring in wetlands than those having the next lowest general indicator. For example, a species with an indicator status of FACW- occurs less often in wetlands than a species designated as FACW, but more often than a species having a FAC+ status.

4. FDEP Status: From regulations concerning the delineation of the landward extent wetlands and surface waters, 17-340.450 Vegetative Index.

OBL - Obligate plants

FACW - Facultative Wet plants

FAC - Facultative plants; for the purposes of this rule facultative plants are not indicators of either wetland or upland conditions

U - Upland Plants

NS - No Status (vines and aquatics)

5. DERM Status is from new wetland ordinance passed in June 1994 which adopts that above-referenced state classification.

6. p = prairie, prairie with Melaleuca 10% to 50% and prairie with Melaleuca 50% to 75%;

dm = dense Melaleuca and Dense Melaleuca saplings;

fd = forested disturbed;

od = open disturbed;

ti = tree islands and willow heads;

w = impounded wet areas and canals;

dv = developed areas;

ag = agricultural areas

7. T-FDA = threatened by the State of Florida
CE = commercially-exploited by the State of Florida
R-DC = Rare by Dade County
UC-DC = Uncommon to Common by Dade County

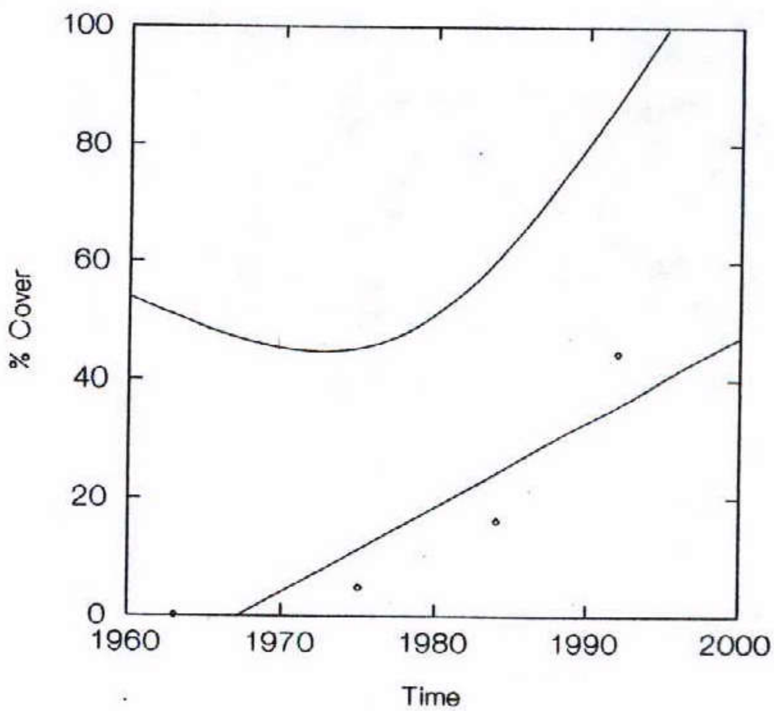
APPENDIX E

Statistical Analysis: Melaleuca Expansion in entire Lake Belt Region

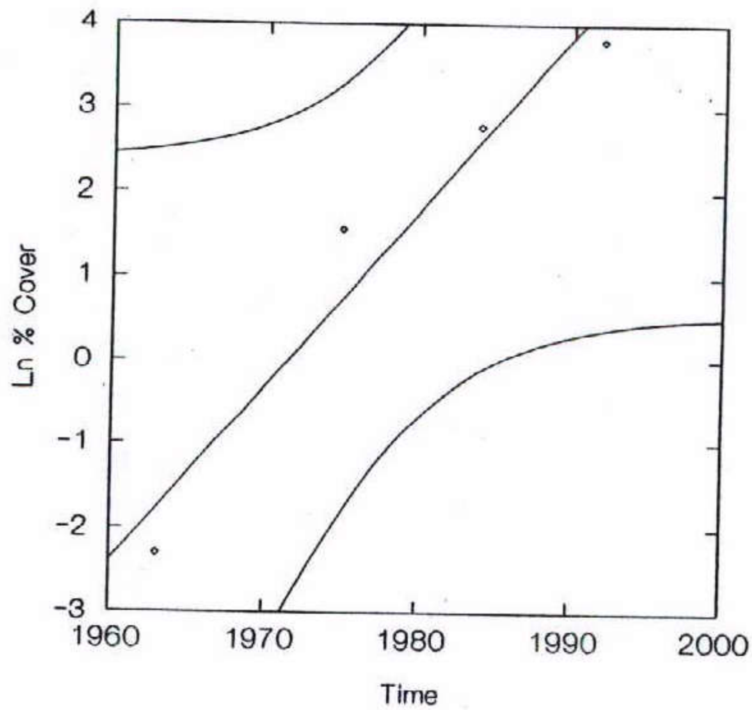
Melaleuca Expansion in Entire Lakebelt

```
>LIST YEAR M LOGM SQRTM
                    YEAR          M         LOGM       SQRTM
 CASE      1      1963.000      0.100     -2.303      0.316
 CASE      2      1975.000      4.800      1.569      2.191
 CASE      3      1984.000     16.100      2.779      4.012
 CASE      4      1992.000     44.400      3.793      6.663
```

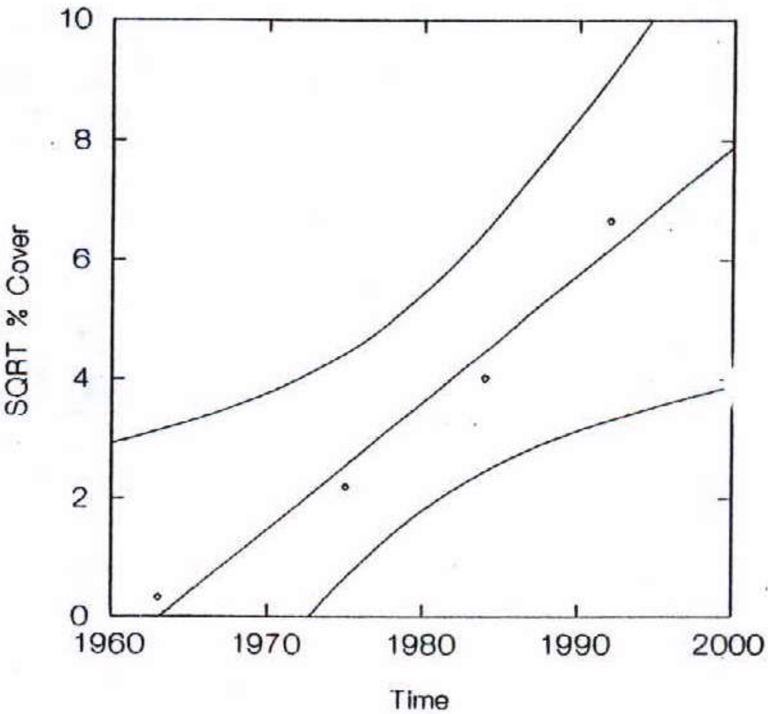
Melaleuca Expansion: Entire Lakebelt (with 95% C.L.)



Melaleuca Expansion: Entire Lakebelt (with 95% C.L.)



Melaleuca Expansion: Entire Lakebelt (with 95% C.L.)



Melaleuca Expansion in Entire Lakebelt

WED 7/31/96 12:47:27 PM C:\SYSTATW5\9338\TOTCOV2.SYS

Non-Transformed

DEP VAR: M N: 4 MULTIPLE R: 0.902 SQUARED MULTIPLE R: 0.814
ADJUSTED SQUARED MULTIPLE R: .721 STANDARD ERROR OF ESTIMATE: 10.491

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-2832.690	962.536	0.000	.	-2.943	0.099
YEAR	1.440	0.486	0.902	1.000	2.960	0.098

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	964.224	1	964.224	8.761	0.098
RESIDUAL	220.106	2	110.053		

>MODEL LOGM = CONSTANT+YEAR
>ESTIMATE

WED 7/31/96 12:47:43 PM C:\SYSTATW5\9338\TOTCOV2.SYS

Ln Transformation

DEP VAR: LOGM N: 4 MULTIPLE R: 0.970 SQUARED MULTIPLE R: 0.942
ADJUSTED SQUARED MULTIPLE R: .912 STANDARD ERROR OF ESTIMATE: 0.789

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-409.950	72.419	0.000	.	-5.661	0.030
YEAR	0.208	0.037	0.970	1.000	5.681	0.030

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	20.106	1	20.106	32.274	0.030
RESIDUAL	1.246	2	0.623		

>MODEL SQRTM = CONSTANT+YEAR
>ESTIMATE

WED 7/31/96 12:47:53 PM C:\SYSTATW5\9338\TOTCOV2.SYS

SQRT Transformation

DEP VAR: SQRTM N: 4 MULTIPLE R: 0.984 SQUARED MULTIPLE R: 0.969
ADJUSTED SQUARED MULTIPLE R: .953 STANDARD ERROR OF ESTIMATE: 0.584

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-419.865	53.556	0.000	.	-7.840	0.016
YEAR	0.214	0.027	0.984	1.000	7.901	0.016

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	21.271	1	21.271	62.433	0.016
RESIDUAL	0.681	2	0.341		

APPENDIX F

Statistical Analysis: Melaleuca Expansion in 8 Representative Sections

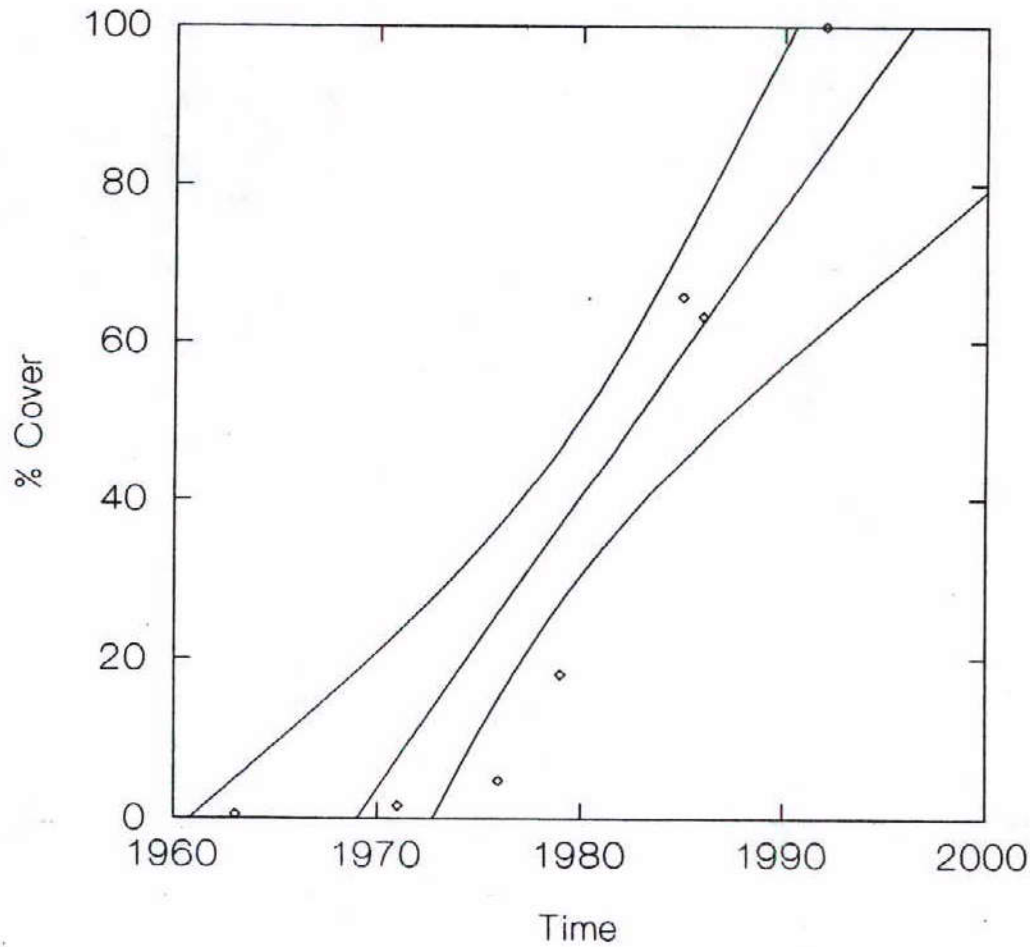
Melaleuca Cover in Eight Sections: Untransformed Data

WED 3/13/96 14:43:31 C:\SYSTATW5\9338\LBCOVER.SYS

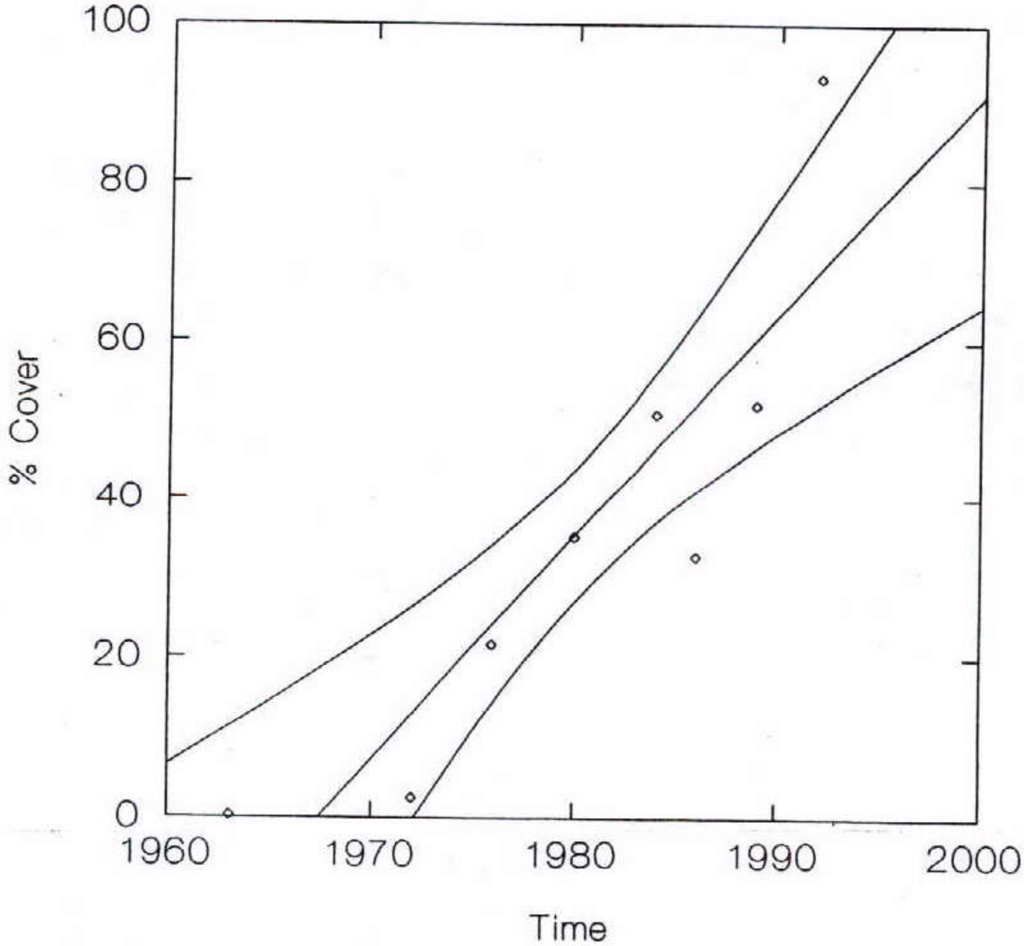
		S12T53R3	S22T52R3	S28T53R3	S29T53R3	S30T52R3	S4T53R39	S5T52R40	S5T54R39	YEAR
CASE	1	0.50	0.20	0.04	0.00	0.00	0.00	0.50	0.00	1963.00
CASE	2	3.50	.	.	.	.	.	1.60	.	1971.00
CASE	3	.	2.50	0.23	0.00	0.00	0.50	.	.	1972.00
CASE	4	.	21.60	21.30	0.00	6.70	.	4.70	2.50	1976.00
CASE	5	58.80	.	.	.	.	8.50	.	.	1977.00
CASE	6	.	.	.	.	.	.	18.00	4.90	1979.00
CASE	7	46.70	35.00	23.90	0.00	7.60	12.40	.	.	1980.00
CASE	8	78.70	.	.	.	.	.	.	.	1983.00
CASE	9	.	50.80	24.70	0.00	3.70	14.70	.	.	1984.00
CASE	10	.	.	.	.	.	.	65.70	.	1985.00
CASE	11	92.80	32.70	17.40	0.00	.	16.10	63.20	2.60	1986.00
CASE	12	.	.	.	.	3.20	.	.	.	1987.00
CASE	13	99.00	52.00	46.00	0.50	.	56.50	.	17.70	1989.00
CASE	14	.	.	.	.	1.50	.	.	.	1990.00
CASE	15	100.00	93.20	83.80	59.60	22.10	96.40	100.00	96.50	1992.00

15 CASES AND 9 VARIABLES PROCESSED.
NO SYSTAT FILE CREATED.

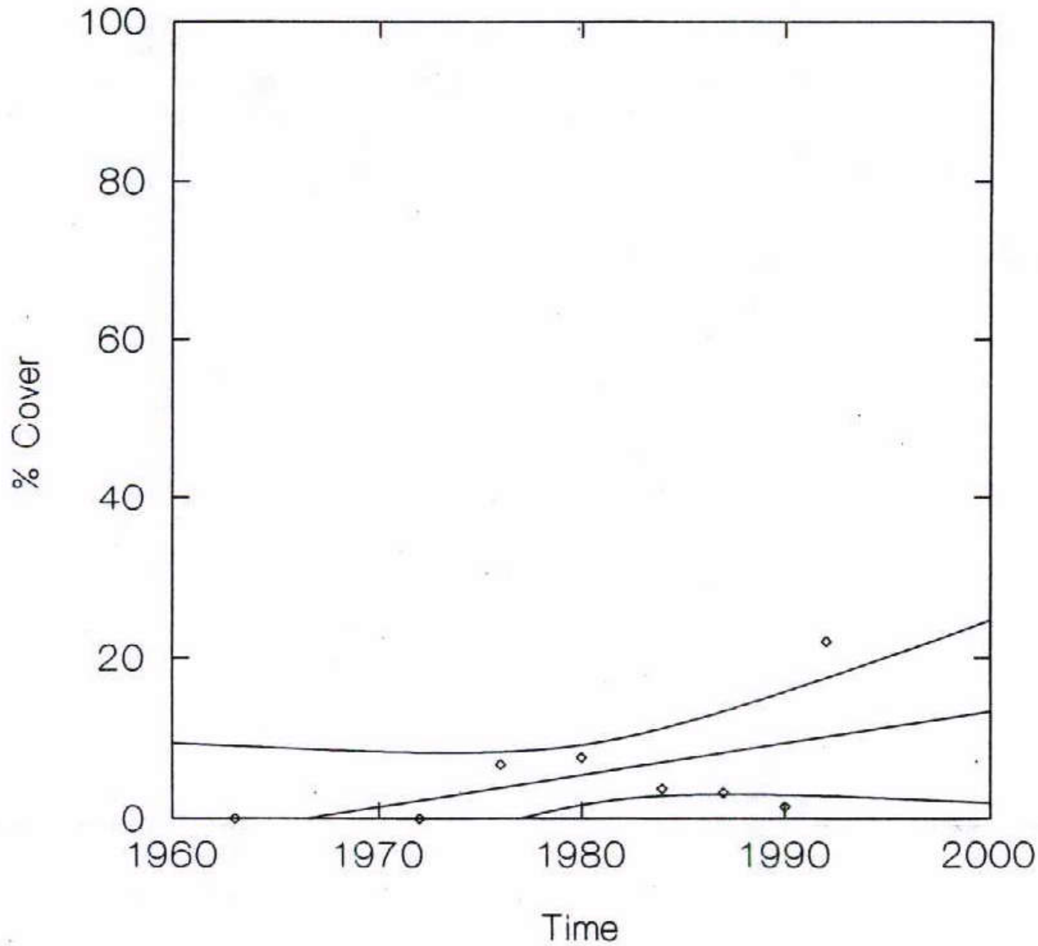
Melaleuca Expansion in Sec.05-52-40



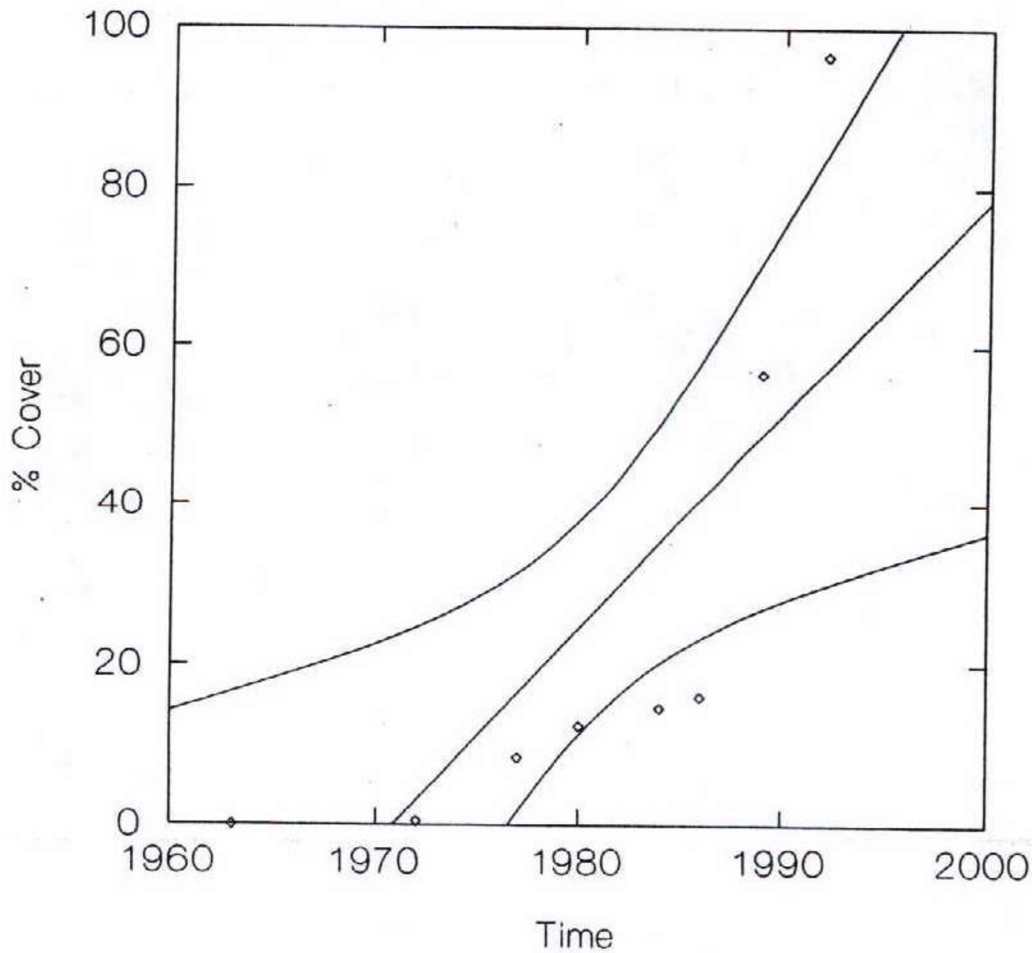
Melaleuca Expansion in Sec.22-52-39



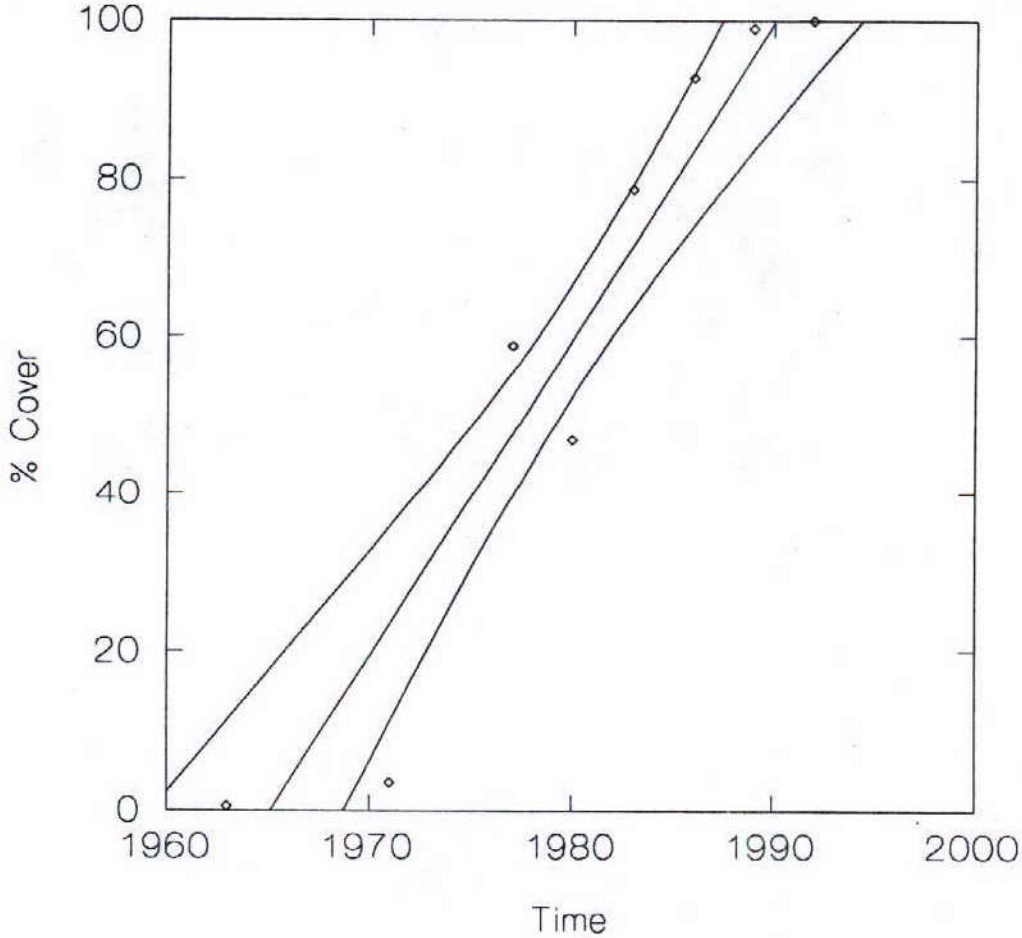
Melaleuca Expansion in Sec.30-52-39



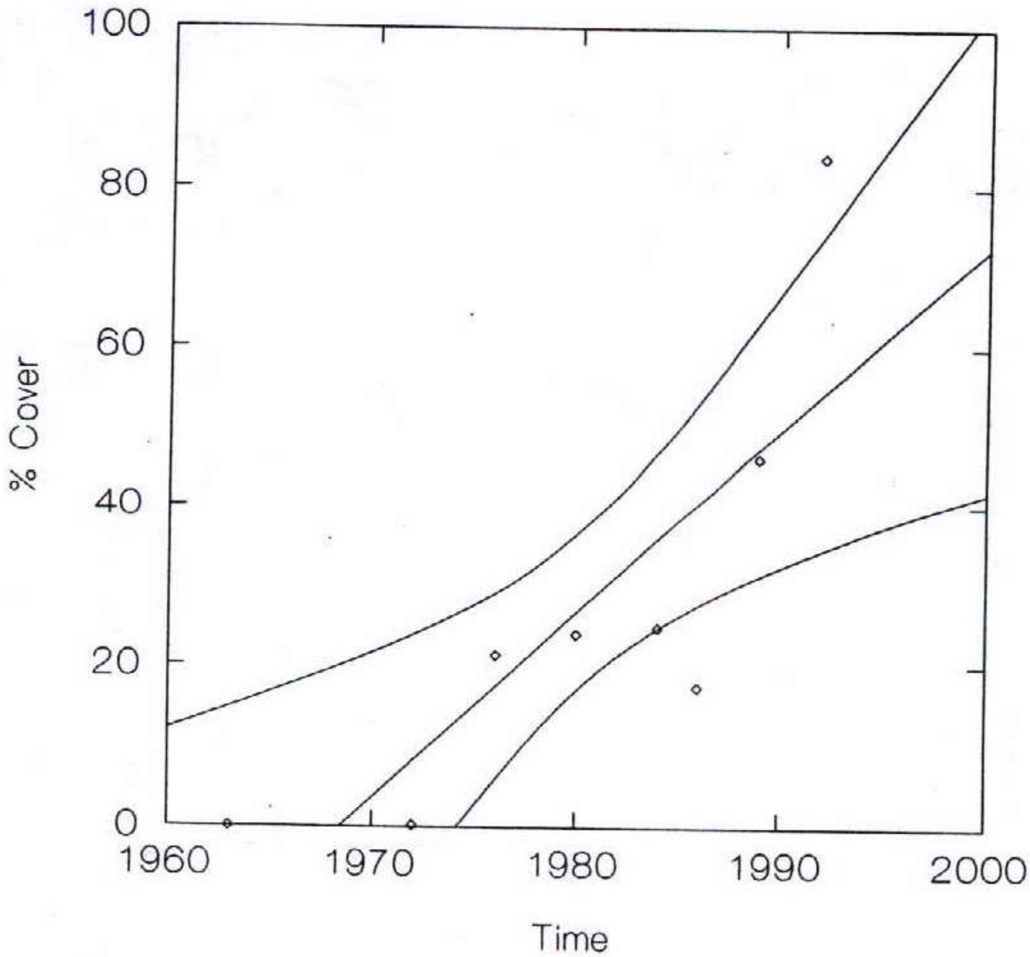
Melaleuca Expansion in Sec.04-53-39



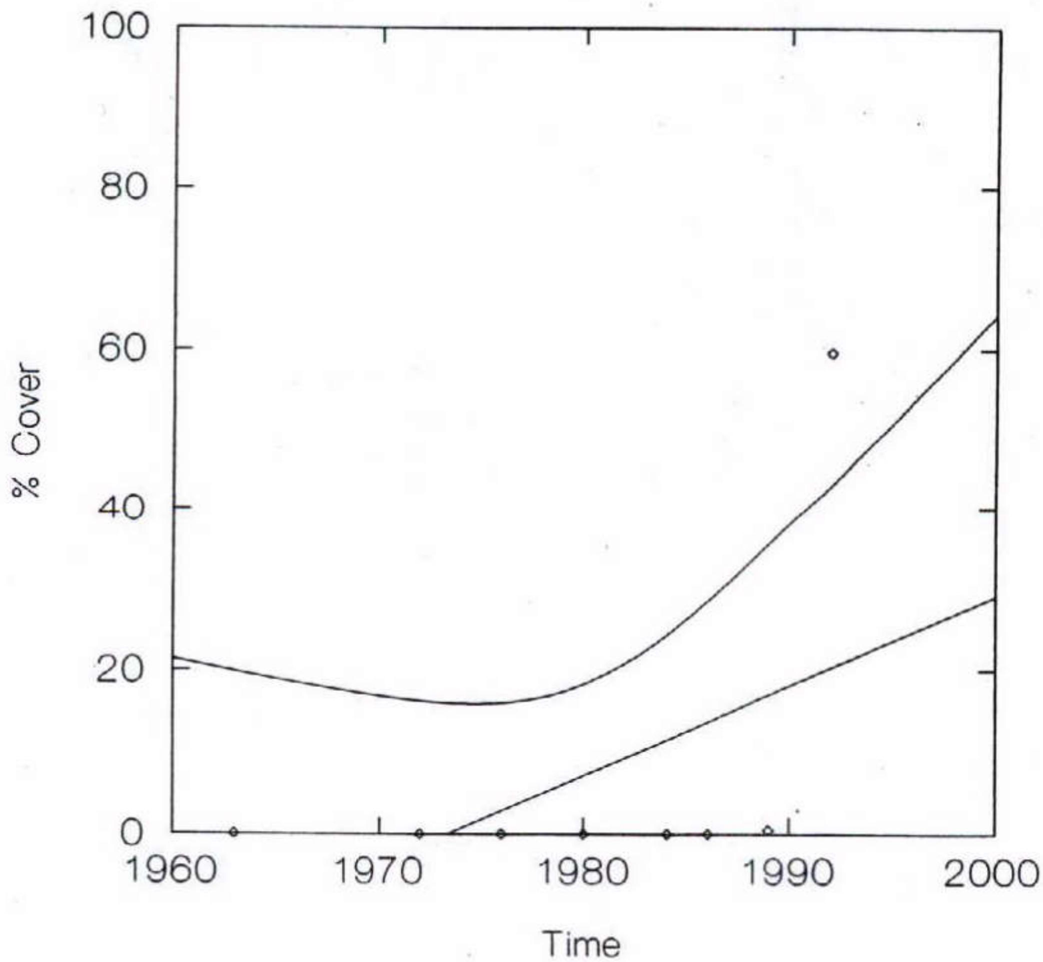
Melaleuca Expansion in Sec. 12-53-39



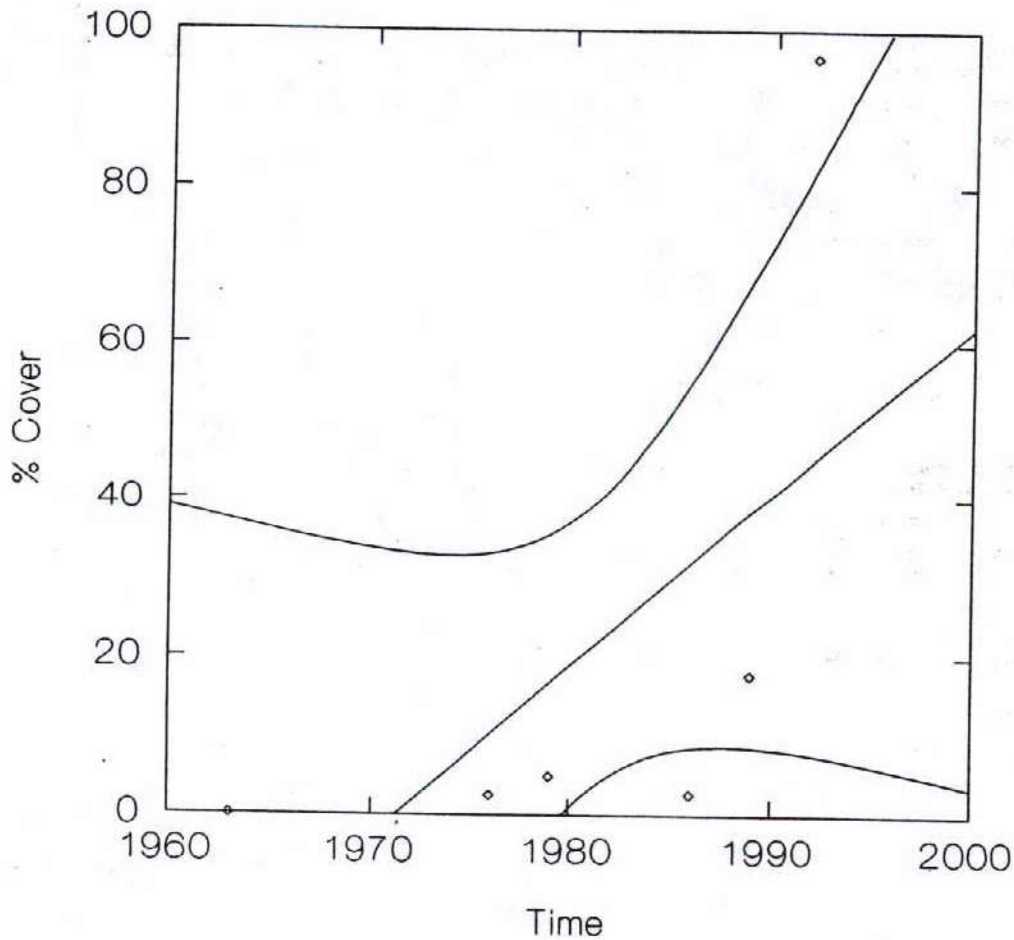
Melaleuca Expansion in Sec.28-53-39



Melaleuca Expansion in Sec.29-53-39



Melaleuca Expansion in Sec.05-54-39



Regression Statistics for Melaleuca Expansion: Untransformed Data

Sec. 05-52-40

DEP VAR:S5T52R40 N: 7 MULTIPLE R: 0.910 SQUARED MULTIPLE R: 0.829
ADJUSTED SQUARED MULTIPLE R: .794 STANDARD ERROR OF ESTIMATE: .180153E+02

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.722228E+04	.147666E+04	0.000000000	.	-4.89096	0.00451
YEAR	3.668039216	0.746209779	0.910246290	.100E+01	4.91556	0.00441

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.784206E+04	1	.784206E+04	.241627E+02	0.004414452
RESIDUAL	.162276E+04	5	.324552E+03		

THU 3/14/96 11:53:25 C:\SYSTATW5\9338\LBCOVER.SYS
7 CASES DELETED DUE TO MISSING DATA.

Sec. 22-52-39

DEP VAR:S22T52R3 N: 8 MULTIPLE R: 0.890 SQUARED MULTIPLE R: 0.791
ADJUSTED SQUARED MULTIPLE R: .757 STANDARD ERROR OF ESTIMATE: .148791E+02

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.549827E+04	.115972E+04	0.000000000	.	-4.74104	0.00319
YEAR	2.794732765	0.585636248	0.889647601	.100E+01	4.77213	0.00309

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.504170E+04	1	.504170E+04	.227732E+02	0.003087666
RESIDUAL	.132832E+04	6	.221387E+03		

THU 3/14/96 11:53:43 C:\SYSTATW5\9338\LBCOVER.SYS
7 CASES DELETED DUE TO MISSING DATA.

Sec. 30-52-39

DEP VAR:S30T52R3 N: 8 MULTIPLE R: 0.539 SQUARED MULTIPLE R: 0.290
ADJUSTED SQUARED MULTIPLE R: .172 STANDARD ERROR OF ESTIMATE: 6.582208852

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.780155E+03	.501393E+03	0.000000000	.	-1.55598	0.17072
YEAR	0.396745562	0.253161879	0.538928810	.100E+01	1.56716	0.16812

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.106407E+03	1	.106407E+03	2.455995318	0.168120872
RESIDUAL	.259953E+03	6	.433255E+02		

THU 3/14/96 11:53:54 C:\SYSTATW5\9338\LBCOVER.SYS
7 CASES DELETED DUE TO MISSING DATA.

Sec. 04-53-39

DEP VAR:S4T53R39 N: 8 MULTIPLE R: 0.762 SQUARED MULTIPLE R: 0.581
ADJUSTED SQUARED MULTIPLE R: .511 STANDARD ERROR OF ESTIMATE: .235279E+02

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.529662E+04	.184488E+04	0.000000000	.	-2.87099	0.02839
YEAR	2.687497550	0.931570140	0.762289327	.100E+01	2.88491	0.02788

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.460714E+04	1	.460714E+04	8.322715232	0.027878224
RESIDUAL	.332138E+04	6	.553563E+03		

Regression Statistics for Melaleuca Expansion: Untransformed Data

Sec. 12-53-39

```
DEP VAR:S12T53R3     N:       8  MULTIPLE R: 0.956  SQUARED MULTIPLE R: 0.915
ADJUSTED SQUARED MULTIPLE R:   .900    STANDARD ERROR OF ESTIMATE:   .127746E+02

VARIABLE      COEFFICIENT    STD ERROR      STD COEF TOLERANCE    T     P(2 TAIL)

CONSTANT     -.789712E+04   .993031E+03   0.000000000   .        -7.95254  0.00021
YEAR         4.018493547   0.501494095   0.956316208  .100E+01   8.01304  0.00020

                        ANALYSIS OF VARIANCE

SOURCE       SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION    .104782E+05      1  .104782E+05 .642089E+02 0.000201633
RESIDUAL      .979138E+03      6  .163190E+03
------------------------------------------------------------------------------------------

THU 3/14/96 11:55:01   C:\SYSTATW5\9338\LBCOVER.SYS
    7 CASES DELETED DUE TO MISSING DATA.
```

Sec. 28-53-39

```
DEP VAR:S28T53R3     N:       8  MULTIPLE R: 0.811  SQUARED MULTIPLE R: 0.657
ADJUSTED SQUARED MULTIPLE R:   .600    STANDARD ERROR OF ESTIMATE:   .171916E+02

VARIABLE      COEFFICIENT    STD ERROR      STD COEF TOLERANCE    T     P(2 TAIL)

CONSTANT     -.451540E+04   .133996E+04   0.000000000   .        -3.36979  0.01505
YEAR         2.293938807   0.676656753   0.810556747  .100E+01   3.39011  0.01467

                        ANALYSIS OF VARIANCE

SOURCE       SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION    .339672E+04      1  .339672E+04 .114928E+02 0.014673699
RESIDUAL      .177331E+04      6  .295551E+03
------------------------------------------------------------------------------------------

THU 3/14/96 11:55:13   C:\SYSTATW5\9338\LBCOVER.SYS
    7 CASES DELETED DUE TO MISSING DATA.
```

Sec. 29-53-39

```
DEP VAR:S29T53R3     N:       8  MULTIPLE R: 0.498  SQUARED MULTIPLE R: 0.248
ADJUSTED SQUARED MULTIPLE R:   .123    STANDARD ERROR OF ESTIMATE:   .197131E+02

VARIABLE      COEFFICIENT    STD ERROR      STD COEF TOLERANCE    T     P(2 TAIL)

CONSTANT     -.215427E+04   .153649E+04   0.000000000   .        -1.40207  0.21045
YEAR         1.091673122   0.775901231   0.498076725  .100E+01   1.40697  0.20906

                        ANALYSIS OF VARIANCE

SOURCE       SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION    .769275E+03      1  .769275E+03 1.979576793 0.209064899
RESIDUAL      .233163E+04      6  .388606E+03
------------------------------------------------------------------------------------------

THU 3/14/96 11:55:29   C:\SYSTATW5\9338\LBCOVER.SYS
    9 CASES DELETED DUE TO MISSING DATA.
```

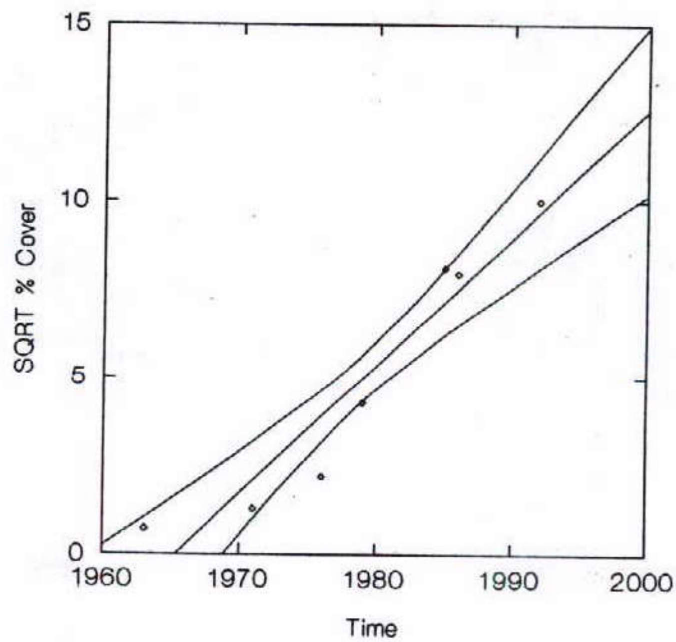
Sec. 05-54-39

```
DEP VAR:S5T54R39     N:       6  MULTIPLE R: 0.608  SQUARED MULTIPLE R: 0.370
ADJUSTED SQUARED MULTIPLE R:   .212    STANDARD ERROR OF ESTIMATE:   .334325E+02

VARIABLE      COEFFICIENT    STD ERROR      STD COEF TOLERANCE    T     P(2 TAIL)

CONSTANT     -.425361E+04   .279147E+04   0.000000000   .        -1.52379  0.20224
YEAR         2.157832396   1.409221169   0.607903839  .100E+01   1.53122  0.20047

                        ANALYSIS OF VARIANCE

SOURCE       SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION    .262069E+04      1  .262069E+04 2.344645026 0.200468784
RESIDUAL      .447093E+04      4  .111773E+04
------------------------------------------------------------------------------------------
```

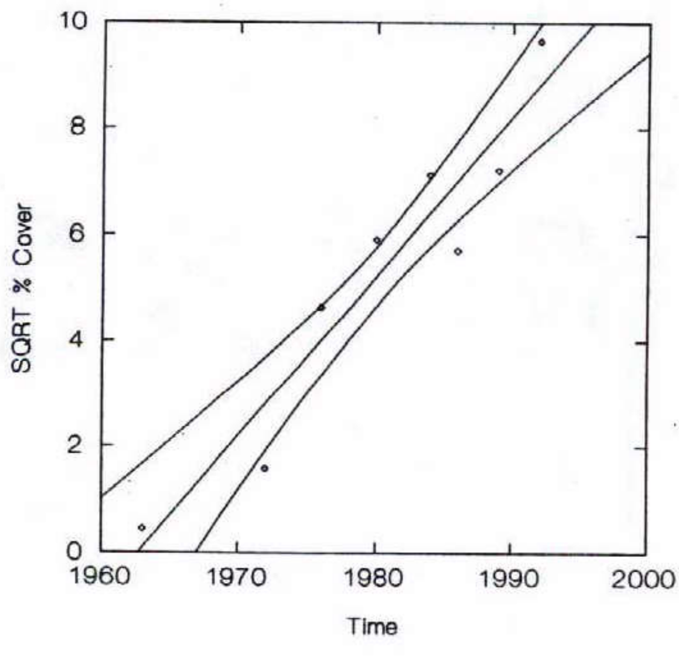
Melaleuca Cover in Eight Sections: SQRT Transformation

		S5T52R40	S22T52R3	S30T52R3	S4T53R39	S12T53R3	S28T53R3	S29T53R3	S5T54R39	YEAR
CASE	1	0.71	0.45	0.00	0.00	0.71	0.20	0.00	0.00	1963.00
CASE	2	1.26	.	.	.	1.87	.	.	.	1971.00
CASE	3	.	1.58	0.00	0.71	.	0.48	0.00	.	1972.00
CASE	4	2.17	4.65	2.59	.	.	4.62	0.00	1.58	1976.00
CASE	5	.	.	.	2.92	7.67	.	.	.	1977.00
CASE	6	4.24	.	.	.	.	.	.	2.21	1979.00
CASE	7	.	5.92	2.76	3.52	6.83	4.89	0.00	.	1980.00
CASE	8	.	.	.	.	8.87	.	.	.	1983.00
CASE	9	.	7.13	1.92	3.83	.	4.97	0.00	.	1984.00
CASE	10	8.11	.	.	.	.	.	.	.	1985.00
CASE	11	7.95	5.72	.	4.01	9.63	4.17	0.00	1.61	1986.00
CASE	12	.	.	1.79	.	.	.	.	.	1987.00
CASE	13	.	7.21	.	7.52	9.95	6.78	0.71	4.21	1989.00
CASE	14	.	.	1.22	.	.	.	.	.	1990.00
CASE	15	10.00	9.65	4.70	9.82	10.00	9.15	7.72	9.82	1992.00

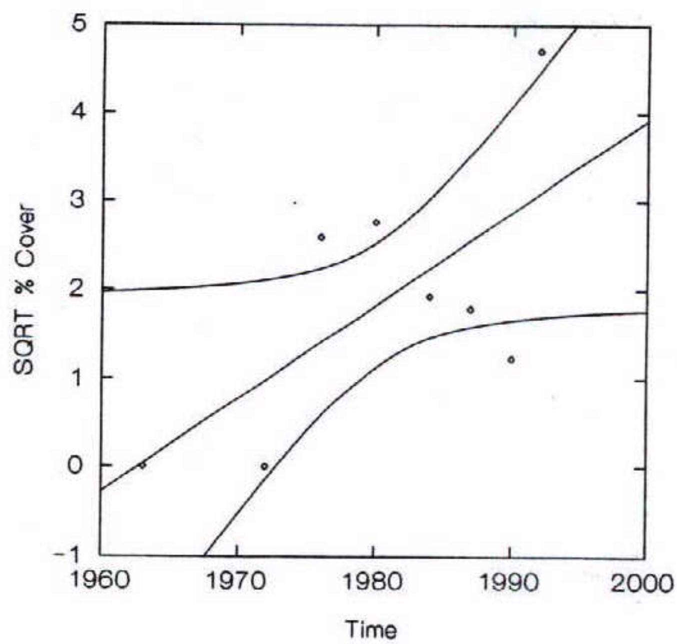
Melaleuca Expansion in Sec. 05-52-40



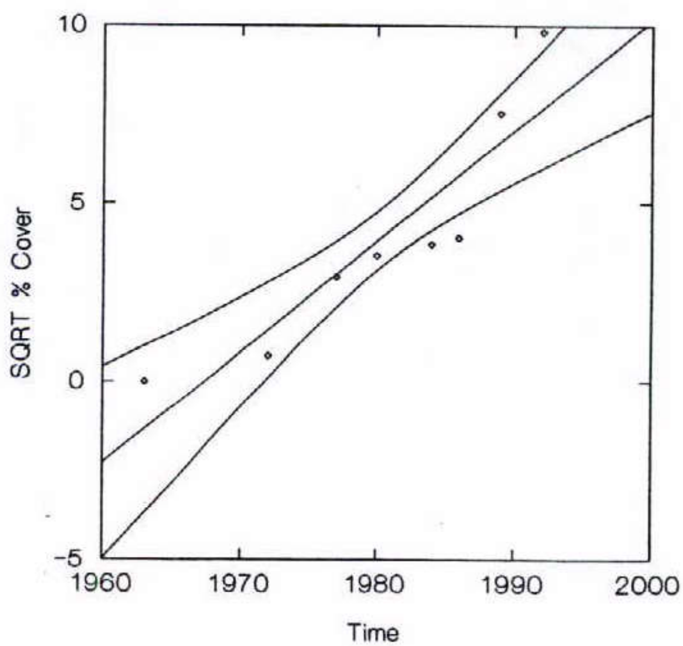
Melaleuca Expansion in Sec. 22-52-39



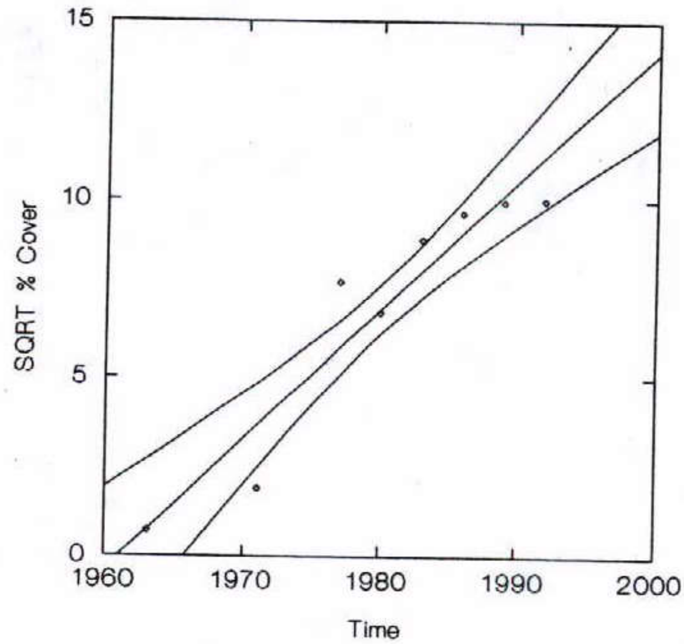
Melaleuca Expansion in Sec. 30-52-39



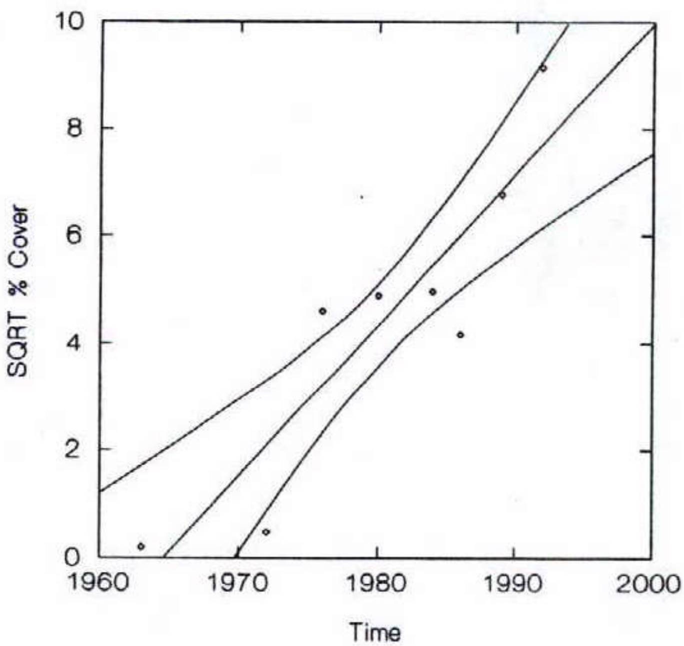
Melaleuca Expansion in Sec. 04-53-39



Melaleuca Expansion in Sec. 12-53-39



Melaleuca Expansion in Sec. 28-53-39



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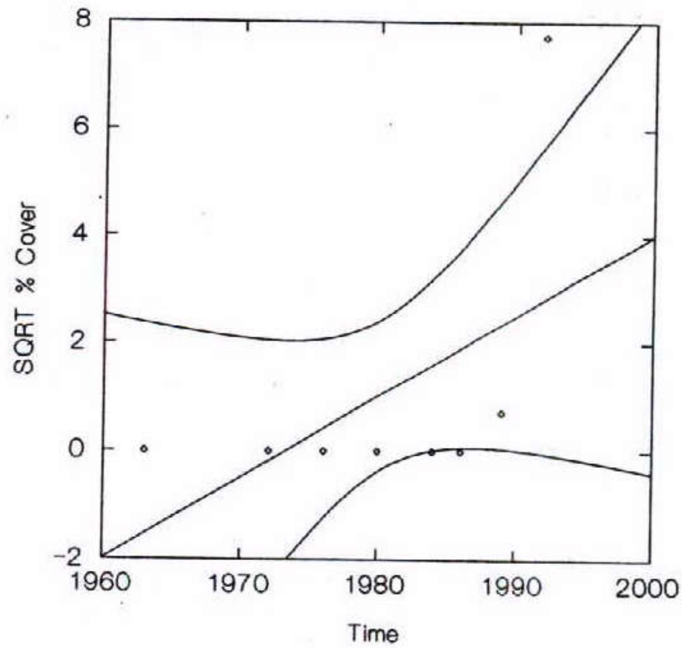
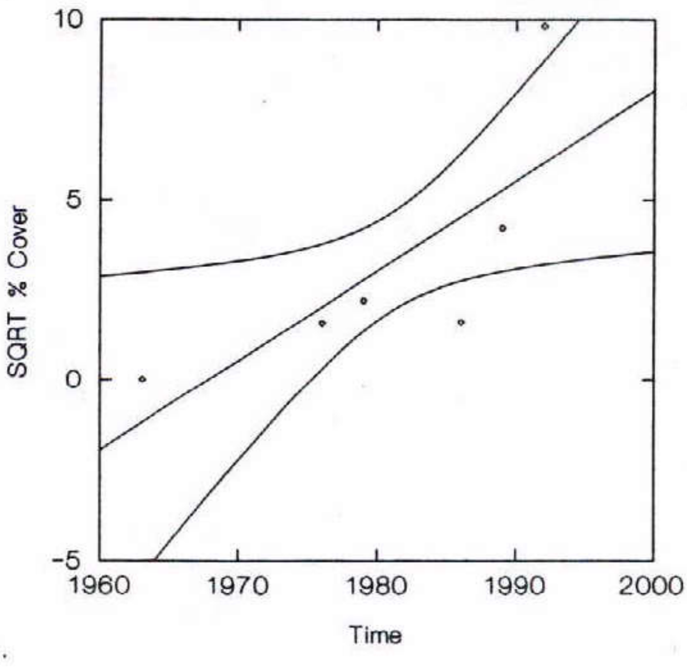
Melaleuca Expansion in Sec. 29-53-39



Melaleuca Expansion in Sec. 05-54-39



Regression Statistics for Melaleuca Expansion: SQRT-Transformed Data

Sec. 05-52-40

```
DEP VAR:SQR55240      N:      7  MULTIPLE R: 0.953  SQUARED MULTIPLE R: 0.909
ADJUSTED SQUARED MULTIPLE R:  .890    STANDARD ERROR OF ESTIMATE:  1.240864587

VARIABLE     COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT    -.712346E+03  .101710E+03  0.000000000  .          -7.00372  0.00091
YEAR         0.362464622  0.051397658  0.953229994  .100E+01  7.05216  0.00089

                      ANALYSIS OF VARIANCE

SOURCE      SUM-OF-SQUARES  DF  MEAN-SQUARE    F-RATIO       P

REGRESSION    .765761E+02    1  .765761E+02 .497330E+02 0.000885938
RESIDUAL     7.698724621     5  1.539744924
--------------------------------------------------------------------------------

THU 3/14/96 11:21:23   C:\SYSTATW5\9338\COVSQR.SYS
    7 CASES DELETED DUE TO MISSING DATA.
```

Sec. 22-52-39

```
DEP VAR:SQR22523      N:      8  MULTIPLE R: 0.953  SQUARED MULTIPLE R: 0.908
ADJUSTED SQUARED MULTIPLE R:  .893    STANDARD ERROR OF ESTIMATE:  0.992653624

VARIABLE     COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT    -.590322E+03  .773703E+02  0.000000000  .          -7.62983  0.00026
YEAR         0.300775058  0.039070558  0.952924155  .100E+01  7.69825  0.00025

                      ANALYSIS OF VARIANCE

SOURCE      SUM-OF-SQUARES  DF  MEAN-SQUARE    F-RATIO       P

REGRESSION    .583956E+02    1  .583956E+02 .592631E+02 0.000251694
RESIDUAL     5.912167309     6  0.985361218
--------------------------------------------------------------------------------

THU 3/14/96 11:21:38   C:\SYSTATW5\9338\COVSQR.SYS
    7 CASES DELETED DUE TO MISSING DATA.
```

Sec. 30-52-39

```
DEP VAR:SQR30523      N:      8  MULTIPLE R: 0.668  SQUARED MULTIPLE R: 0.446
ADJUSTED SQUARED MULTIPLE R:  .354    STANDARD ERROR OF ESTIMATE:  1.243211629

VARIABLE     COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT    -.206229E+03  .947003E+02  0.000000000  .          -2.17770  0.07229
YEAR         0.105075267  0.047815832  0.667781723  .100E+01  2.19750  0.07034

                      ANALYSIS OF VARIANCE

SOURCE      SUM-OF-SQUARES  DF  MEAN-SQUARE    F-RATIO       P

REGRESSION   7.463588792     1  7.463588792 4.829004120 0.070344094
RESIDUAL     9.273450931     6  1.545575155
--------------------------------------------------------------------------------

THU 3/14/96 11:21:53   C:\SYSTATW5\9338\COVSQR.SYS
    7 CASES DELETED DUE TO MISSING DATA.
```

Sec. 04-53-39

```
DEP VAR:SQR45339      N:      8  MULTIPLE R: 0.910  SQUARED MULTIPLE R: 0.828
ADJUSTED SQUARED MULTIPLE R:  .799    STANDARD ERROR OF ESTIMATE:  1.460678282

VARIABLE     COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT    -.611784E+03  .114535E+03  0.000000000  .          -5.34145  0.00176
YEAR         0.310963453  0.057834473  0.910015663  .100E+01  5.37678  0.00170

                      ANALYSIS OF VARIANCE

SOURCE      SUM-OF-SQUARES  DF  MEAN-SQUARE    F-RATIO       P

REGRESSION    .616814E+02    1  .616814E+02 .289098E+02 0.001700828
RESIDUAL      .128015E+02    6  2.133581043
--------------------------------------------------------------------------------
```

Regression Statistics for Melaleuca Expansion: SQRT-Transformed Data

Sec. 12-53-39

DEP VAR:SQR12533 N: 8 MULTIPLE R: 0.950 SQUARED MULTIPLE R: 0.902
ADJUSTED SQUARED MULTIPLE R: .886 STANDARD ERROR OF ESTIMATE: 1.242989267

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.710673E+03	.966238E+02	0.000000000	.	-7.35505	0.00032
YEAR	0.362408828	0.048796296	0.949682355	.100E+01	7.42697	0.00031

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.852233E+02	1	.852233E+02	.551599E+02	0.000306595
RESIDUAL	9.270133912	6	1.545022319		

THU 3/14/96 11:22:46 C:\SYSTATW5\9338\COVSQR.SYS
7 CASES DELETED DUE TO MISSING DATA.

Sec. 28-53-39

DEP VAR:SQR28533 N: 8 MULTIPLE R: 0.907 SQUARED MULTIPLE R: 0.822
ADJUSTED SQUARED MULTIPLE R: .792 STANDARD ERROR OF ESTIMATE: 1.356216692

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.551739E+03	.105707E+03	0.000000000	.	-5.21949	0.00198
YEAR	0.280846832	0.053380294	0.906562991	.100E+01	5.26125	0.00190

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.509138E+02	1	.509138E+02	.276807E+02	0.001899130
RESIDUAL	.110359E+02	6	1.839323717		

THU 3/14/96 11:22:59 C:\SYSTATW5\9338\COVSQR.SYS
7 CASES DELETED DUE TO MISSING DATA.

Sec. 29-53-39

DEP VAR:SQR29533 N: 8 MULTIPLE R: 0.533 SQUARED MULTIPLE R: 0.284
ADJUSTED SQUARED MULTIPLE R: .165 STANDARD ERROR OF ESTIMATE: 2.472414025

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.296209E+03	.192707E+03	0.000000000	.	-1.53710	0.17518
YEAR	0.150113713	0.097313496	0.532889275	.100E+01	1.54258	0.17387

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.145458E+02	1	.145458E+02	2.379548636	0.173874492
RESIDUAL	.366770E+02	6	6.112831111		

THU 3/14/96 11:23:11 C:\SYSTATW5\9338\COVSQR.SYS
9 CASES DELETED DUE TO MISSING DATA.

Sec. 05-54-39

DEP VAR:SQR55439 N: 6 MULTIPLE R: 0.758 SQUARED MULTIPLE R: 0.574
ADJUSTED SQUARED MULTIPLE R: .468 STANDARD ERROR OF ESTIMATE: 2.552645799

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.491883E+03	.213135E+03	0.000000000	.	-2.30785	0.08223
YEAR	0.249956680	0.107597121	0.757838106	.100E+01	2.32308	0.08086

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.351649E+02	1	.351649E+02	5.396698930	0.080863099
RESIDUAL	.260640E+02	4	6.516000577		

Melaleuca Cover in Eight Sections: LOG Transformation

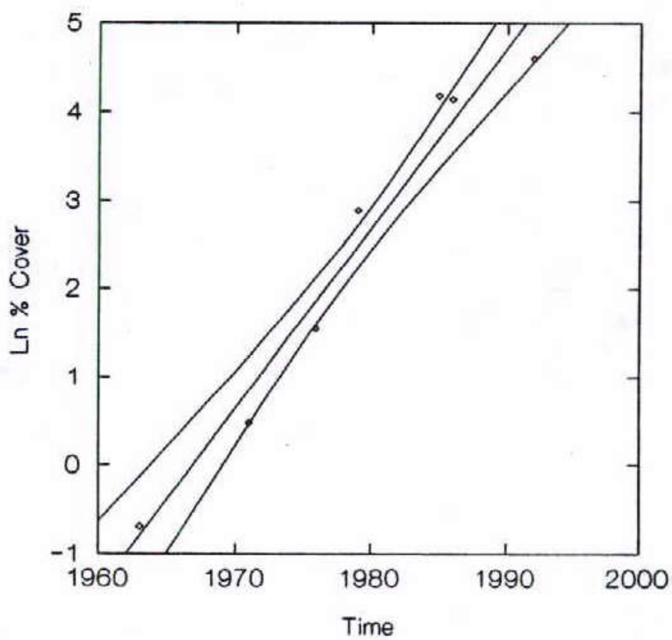
TUE 3/05/96 12:46:36 C:\SYSTATW5\9338\LBCOVER.SYS

		S5T52R40	S22T52R3	S30T52R3	S4T53R39	S12T53R3	S28T53R3	S29T53R3	S5T54R39	YEAR
CASE	1	-0.69	-1.61	.	.	-0.69	-3.22	.	.	1963.00
CASE	2	0.47	.	.	.	1.25	.	.	.	1971.00
CASE	3	.	0.92	.	-0.69	.	-1.47	.	.	1972.00
CASE	4	1.55	3.07	1.90	.	.	3.06	.	0.92	1976.00
CASE	5	.	.	.	2.14	4.07	.	.	.	1977.00
CASE	6	2.89	.	.	.	.	.	.	1.59	1979.00
CASE	7	.	3.56	2.03	2.52	3.84	3.17	.	.	1980.00
CASE	8	.	.	.	.	4.37	.	.	.	1983.00
CASE	9	.	3.93	1.31	2.69	.	3.21	.	.	1984.00
CASE	10	4.19	.	.	.	.	.	.	.	1985.00
CASE	11	4.15	3.49	.	2.78	4.53	2.86	.	0.96	1986.00
CASE	12	.	.	1.16	.	.	.	.	.	1987.00
CASE	13	.	3.95	.	4.03	4.60	3.83	-0.69	2.87	1989.00
CASE	14	.	.	0.41	.	.	.	.	.	1990.00
CASE	15	4.61	4.53	3.10	4.57	4.61	4.43	4.09	4.57	1992.00

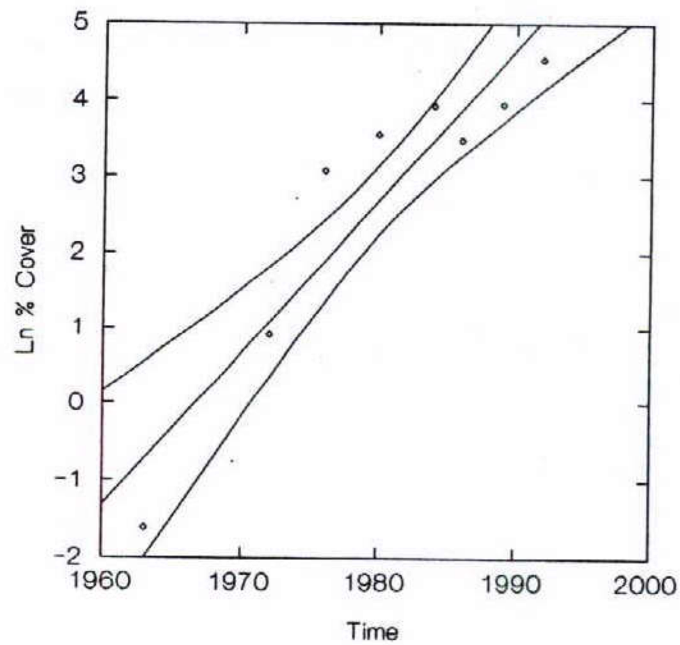
15 CASES AND 9 VARIABLES PROCESSED.
NO SYSTAT FILE CREATED.

DOC#614

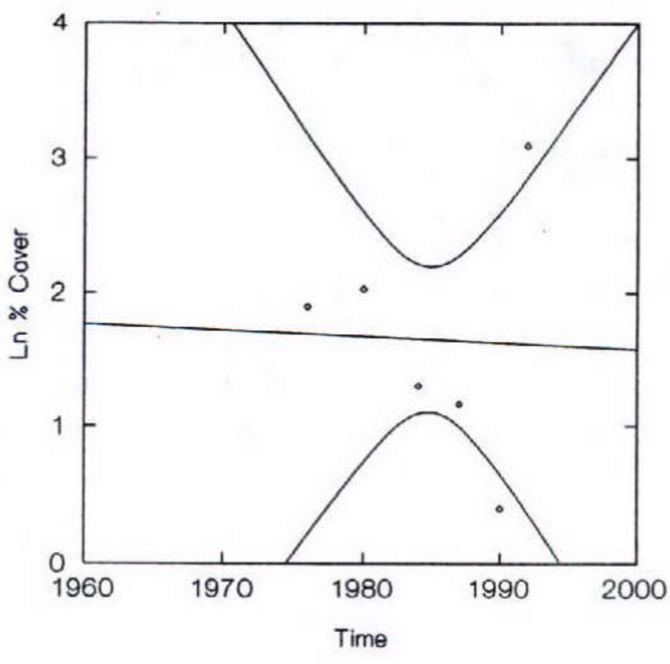
Melaleuca Expansion in Sec. 05-52-40



Melaleuca Expansion in Sec. 22-52-39

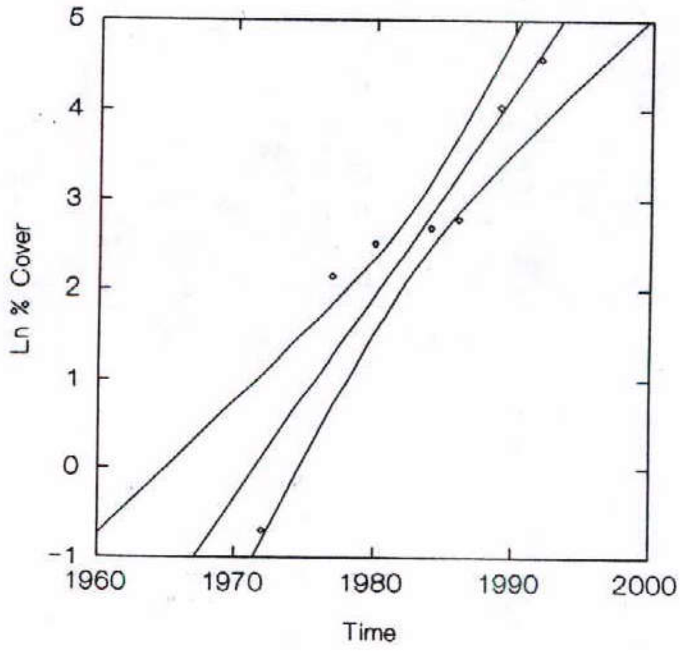


Melaleuca Expansion in Sec. 30-52-39

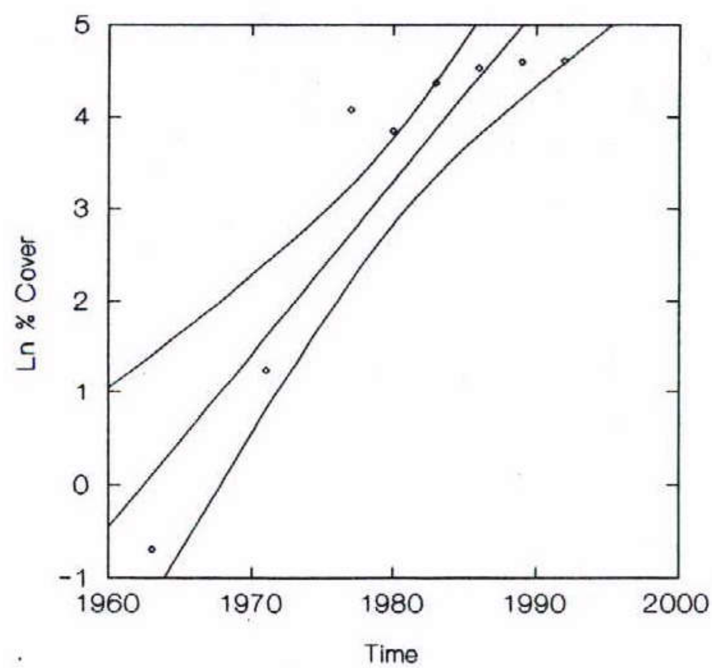


DOC#614

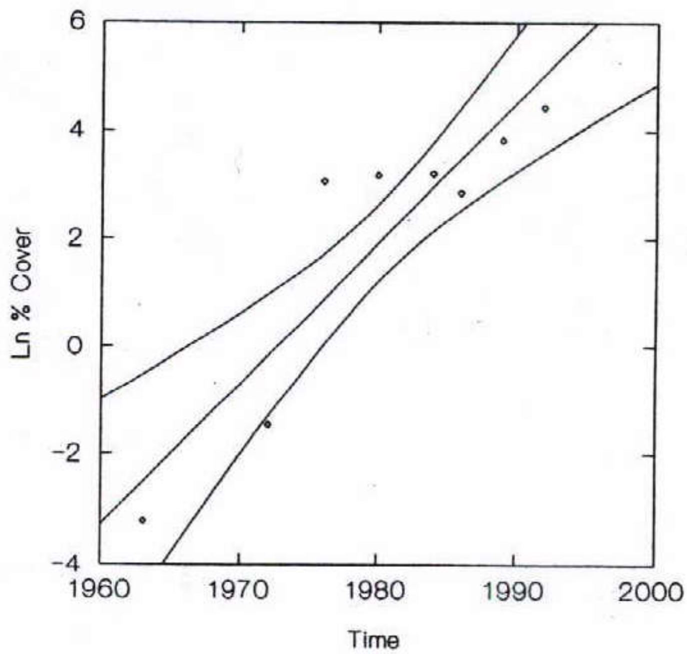
Melaleuca Expansion in Sec. 04-53-39



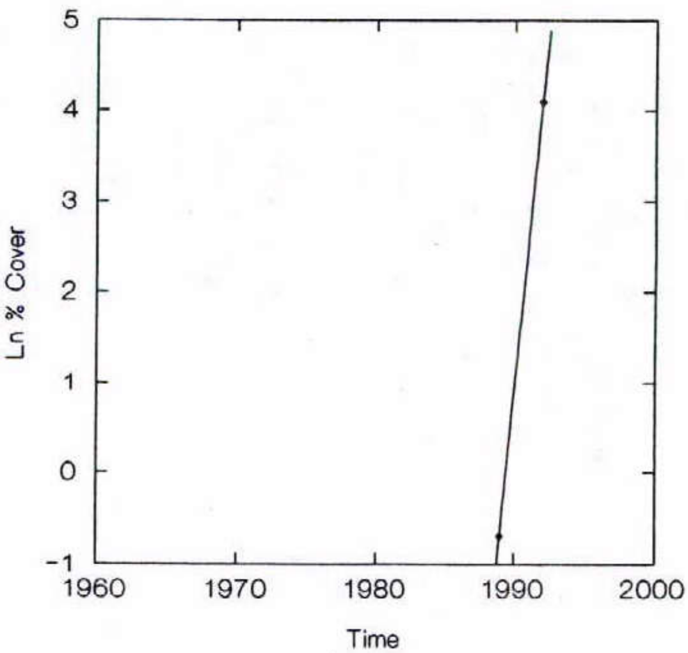
Melaleuca Expansion in Sec. 12-53-39



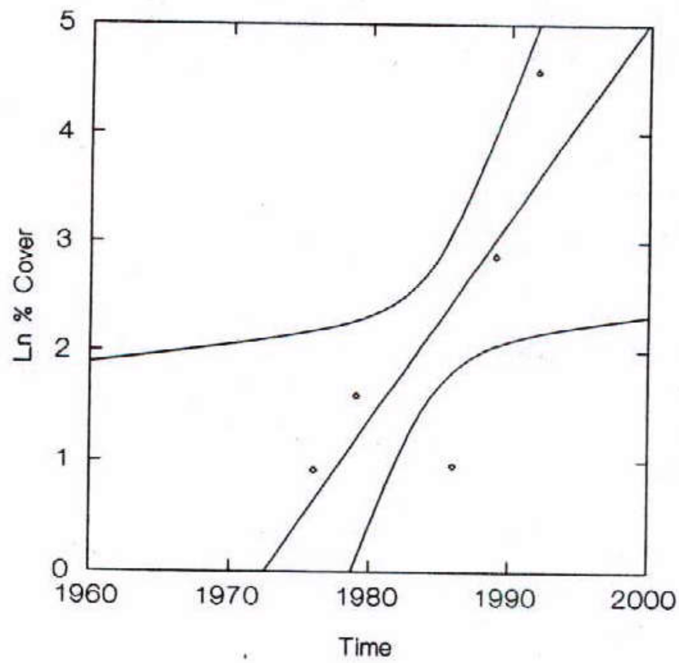
Melaleuca Expansion in Sec. 28-53-39



Melaleuca Expansion in Sec. 29-53-39



Melaleuca Expansion in Sec. 05-54-39



Regression Statistics for Melaleuca Expansion: LOG-Transformed Data

Sec. 05-52-40

```
THU 3/14/96 10:11:17   C:\SYSTATW5\9338\COVLOG.SYS
    8 CASES DELETED DUE TO MISSING DATA.

DEP VAR:S5T52R40      N:        7  MULTIPLE R: 0.980  SQUARED MULTIPLE R: 0.961
ADJUSTED SQUARED MULTIPLE R:   .953     STANDARD ERROR OF ESTIMATE:   0.444503331

VARIABLE      COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT     -.402041E+03  .364345E+02  0.000000000   .         -.11E+02  0.00011
YEAR         0.204406467  0.018411703  0.980313669  .100E+01  .11E+02  0.00010

                    ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION      .243529E+02     1  .243529E+02 .123254E+03 0.000103340
RESIDUAL       0.987916058      5  0.197583212
```

Sec. 22-52-39

```
THU 3/14/96 10:11:40   C:\SYSTATW5\9338\COVLOG.SYS
    7 CASES DELETED DUE TO MISSING DATA.

DEP VAR:S22T52R3      N:        8  MULTIPLE R: 0.931  SQUARED MULTIPLE R: 0.867
ADJUSTED SQUARED MULTIPLE R:   .845     STANDARD ERROR OF ESTIMATE:   0.810168031

VARIABLE      COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT     -.392689E+03  .631468E+02  0.000000000   .         -6.21867  0.00080
YEAR         0.199681345  0.031887978  0.931285353  .100E+01  6.26196  0.00077

                    ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION      .257378E+02     1  .257378E+02 .392122E+02 0.000769898
RESIDUAL       3.938233431      6  0.656372239
```

Sec. 30-52-39

```
THU 3/14/96 10:11:55   C:\SYSTATW5\9338\COVLOG.SYS
    9 CASES DELETED DUE TO MISSING DATA.

DEP VAR:S30T52R3      N:        6  MULTIPLE R: 0.032  SQUARED MULTIPLE R: 0.001
ADJUSTED SQUARED MULTIPLE R:   .000     STANDARD ERROR OF ESTIMATE:   1.024028863

VARIABLE      COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT      .112604E+02  .149502E+03  0.000000000   .          0.07532  0.94358
YEAR        -0.004841701  0.075322036 -0.032123415  .100E+01 -0.06428  0.95183

                    ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION     0.004332875      1  0.004332875 0.004131919 0.951831452
RESIDUAL       4.194540452      4  1.048635113
```

Sec. 04-53-39

```
THU 3/14/96 10:12:07   C:\SYSTATW5\9338\COVLOG.SYS
    8 CASES DELETED DUE TO MISSING DATA.

DEP VAR:S4T53R39      N:        7  MULTIPLE R: 0.937  SQUARED MULTIPLE R: 0.877
ADJUSTED SQUARED MULTIPLE R:   .853     STANDARD ERROR OF ESTIMATE:   0.646132448

VARIABLE      COEFFICIENT    STD ERROR     STD COEF TOLERANCE     T    P(2 TAIL)

CONSTANT     -.445333E+03  .748665E+02  0.000000000   .         -5.94836  0.00192
YEAR         0.225890777  0.037756666  0.936713845  .100E+01  5.98281  0.00187

                    ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

REGRESSION      .149435E+02     1  .149435E+02 .357940E+02 0.001869995
RESIDUAL       2.087435699      5  0.417487140
```

Regression Statistics for Melaleuca Expansion: LOG-Transformed Data

Sec. 12-53-39

DEP VAR:S12T53R3 N: 8 MULTIPLE R: 0.920 SQUARED MULTIPLE R: 0.846
ADJUSTED SQUARED MULTIPLE R: .820 STANDARD ERROR OF ESTIMATE: 0.833826638

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.368556E+03	.648175E+02	0.000000000	.	-5.68606	0.00128
YEAR	0.187805363	0.032733711	0.919688700	.100E+01	5.73737	0.00122

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.228864E+02	1	.228864E+02	.329174E+02	0.001218251
RESIDUAL	4.171601177	6	0.695266863		

THU 3/14/96 10:10:05 C:\SYSTATW5\9338\COVLOG.SYS
7 CASES DELETED DUE TO MISSING DATA.

Sec. 28-53-39

DEP VAR:S28T53R3 N: 8 MULTIPLE R: 0.906 SQUARED MULTIPLE R: 0.820
ADJUSTED SQUARED MULTIPLE R: .790 STANDARD ERROR OF ESTIMATE: 1.262323535

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.512920E+03	.983891E+02	0.000000000	.	-5.21318	0.00199
YEAR	0.260019173	0.049684687	0.905702225	.100E+01	5.23339	0.00195

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.436422E+02	1	.436422E+02	.273883E+02	0.001950798
RESIDUAL	9.560764243	6	1.593460707		

THU 3/14/96 10:10:37 C:\SYSTATW5\9338\COVLOG.SYS
13 CASES DELETED DUE TO MISSING DATA.

Sec. 29-53-39

DEP VAR:S29T53R3 N: 2 MULTIPLE R: 1.000 SQUARED MULTIPLE R: 1.000

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.317037E+04	0.000000000	0.000000000	.	.	.
YEAR	1.593600918	0.000000000	1.000000000	.100E+01	.	.

THU 3/14/96 10:10:54 C:\SYSTATW5\9338\COVLOG.SYS
10 CASES DELETED DUE TO MISSING DATA.

Sec. 05-54-39

DEP VAR:S5T54R39 N: 5 MULTIPLE R: 0.794 SQUARED MULTIPLE R: 0.631
ADJUSTED SQUARED MULTIPLE R: .508 STANDARD ERROR OF ESTIMATE: 1.088480077

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-.361374E+03	.160462E+03	0.000000000	.	-2.25208	0.10973
YEAR	0.183206569	0.080861424	0.794447894	.100E+01	2.26569	0.10836

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	6.081914008	1	6.081914008	5.133331451	0.108355534
RESIDUAL	3.554366632	3	1.184788877		

Lakebelt Melaleuca Expansion Filename: PVALUES

Summary of "P" Values for Slopes of Regressions

	Section							
	05-52-40	22-52-39	30-52-39	04-53-39	12-53-39	28-53-39	29-53-39	05-54-39
Untransformed	0.00441	0.00309	0.16812	0.02788	0.00020	0.01467	0.20906	0.20047
SQRT	0.00089	0.00025	0.07034	0.00170	0.00031	0.00190	0.17387	0.08086
LOGn	0.00010	0.00077	0.95183	0.00187	0.00122	0.00195		0.10836

APPENDIX G

Statistical Analysis: Cover Type vs. Soil Type

COVER TYPE VS SOIL TYPE

WED 3/20/96 17:08:53 C:\SYSTATW5\9338\SOIL1.SYS

		SOILS	SOILACRE	C	D	L	M	ML50	TI
CASE	1	Limestone	125.62	0.05	117.54	1.81	4.93	1.29	0.00
CASE	2	Water-Complx	2181.44	18.06	1813.58	83.95	222.29	37.99	5.59
CASE	3	Biscayn Marl	299.57	1.81	41.20	0.94	13.64	128.46	0.00
CASE	4	Bisc Marl Ro	186.08	1.68	296.54	1.35	0.00	0.00	0.00
CASE	5	Perrine Marl	64.60	0.00	51.80	0.00	0.28	12.52	0.00
CASE	6	Dania Muck	6160.31	51.20	2700.16	54.93	2657.25	575.32	121.54
CASE	7	Lauderhill M	27600.42	206.73	3564.42	308.80	16745.92	6701.55	72.81
CASE	8	Pahokee Muck	6521.62	25.74	191.28	21.02	1669.93	4554.23	59.44
CASE	9	Tamiami Muck	115.78	2.53	47.87	8.05	38.22	19.13	0.00
CASE	10	Matecumbe Mu	8.81	0.00	0.00	0.00	0.70	0.00	8.11
CASE	11	Halland Sand	63.73	0.00	63.26	0.00	0.00	0.00	0.00

11 CASES AND 8 VARIABLES PROCESSED.
NO SYSTAT FILE CREATED.

WED 3/20/96 17:09:17 C:\SYSTATW5\9338\SOIL1.SYS

C

MODEL CONTAINS NO CONSTANT.

DEP VAR: C N: 11 MULTIPLE R: 0.994 SQUARED MULTIPLE R: 0.988
ADJUSTED SQUARED MULTIPLE R: .988 STANDARD ERROR OF ESTIMATE: 7.4227

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
SOILACRE	0.0074	0.0003	0.9940	1.0000	28.8345	0.0000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	45808.9780	1	45808.9780	831.4273	0.0000
RESIDUAL	550.9680	10	55.0968		

WED 3/20/96 17:09:32 C:\SYSTATW5\9338\SOIL1.SYS

D

MODEL CONTAINS NO CONSTANT.

DEP VAR: D N: 11 MULTIPLE R: 0.854 SQUARED MULTIPLE R: 0.729
ADJUSTED SQUARED MULTIPLE R: .729 STANDARD ERROR OF ESTIMATE: 796.7440

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
SOILACRE	0.1420	0.0274	0.8539	1.0000	5.1880	0.0004

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.170860E+08	1	.170860E+08	26.9156	0.0004
RESIDUAL	.634801E+07	10	634800.9446		

WED 3/20/96 17:09:42 C:\SYSTATW5\9338\SOIL1.SYS

L

MODEL CONTAINS NO CONSTANT.

DEP VAR: L N: 11 MULTIPLE R: 0.969 SQUARED MULTIPLE R: 0.940
ADJUSTED SQUARED MULTIPLE R: .940 STANDARD ERROR OF ESTIMATE: 25.2782

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
SOILACRE	0.0108	0.0009	0.9694	1.0000	12.4814	0.0000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	99545.0885	1	99545.0885	155.7854	0.0000
RESIDUAL	6389.8840	10	638.9884		

COVER TYPE VS SOIL TYPE

WED 3/20/96 17:09:53 C:\SYSTATW5\9338\SOIL1.SYS

M

MODEL CONTAINS NO CONSTANT.

DEP VAR: M N: 11 MULTIPLE R: 0.988 SQUARED MULTIPLE R: 0.976
ADJUSTED SQUARED MULTIPLE R: .976 STANDARD ERROR OF ESTIMATE: 835.2670

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
SOILACRE	0.5783	0.0287	0.9879	1.0000	20.1528	0.0000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.283350E+09	1	.283350E+09	406.1368	0.0000
RESIDUAL	.697671E+07	10	697671.0212		

WED 3/20/96 17:10:07 C:\SYSTATW5\9338\SOIL1.SYS

ML50

MODEL CONTAINS NO CONSTANT.

DEP VAR: ML50 N: 11 MULTIPLE R: 0.923 SQUARED MULTIPLE R: 0.853
ADJUSTED SQUARED MULTIPLE R: .853 STANDARD ERROR OF ESTIMATE: 986.5188

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
SOILACRE	0.2577	0.0339	0.9233	1.0000	7.6038	0.0000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.562691E+08	1	.562691E+08	57.8174	0.0000
RESIDUAL	.973219E+07	10	973219.4327		

WED 3/20/96 17:10:19 C:\SYSTATW5\9338\SOIL1.SYS

TI

MODEL CONTAINS NO CONSTANT.

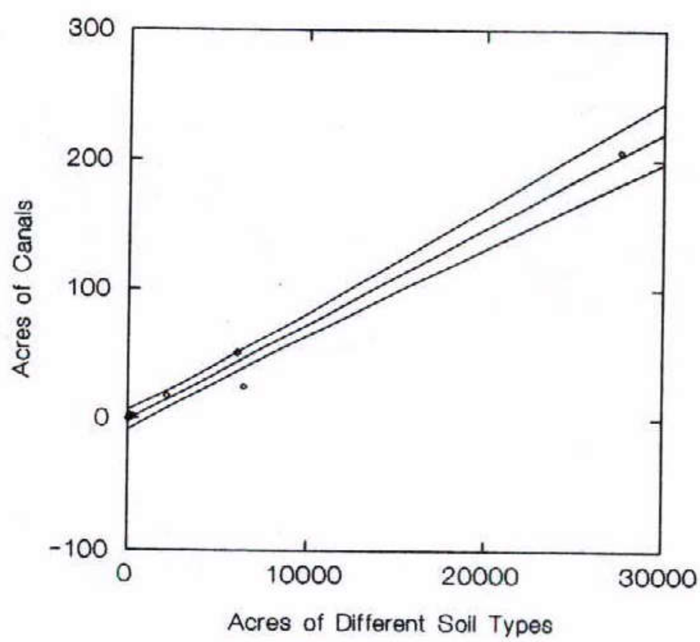
DEP VAR: TI N: 11 MULTIPLE R: 0.705 SQUARED MULTIPLE R: 0.497
ADJUSTED SQUARED MULTIPLE R: .497 STANDARD ERROR OF ESTIMATE: 34.5396

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
SOILACRE	0.0037	0.0012	0.7048	1.0000	3.1415	0.0105

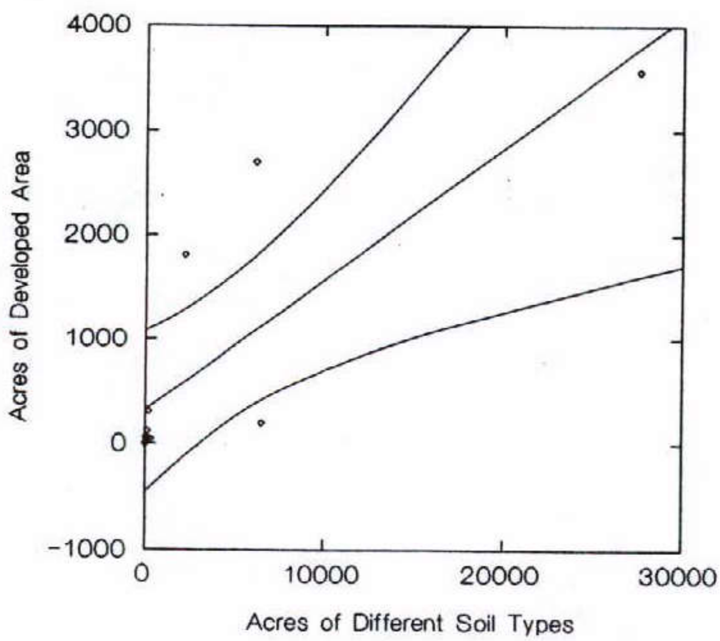
ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	11773.5400	1	11773.5400	9.8690	0.0105
RESIDUAL	11929.8615	10	1192.9861		

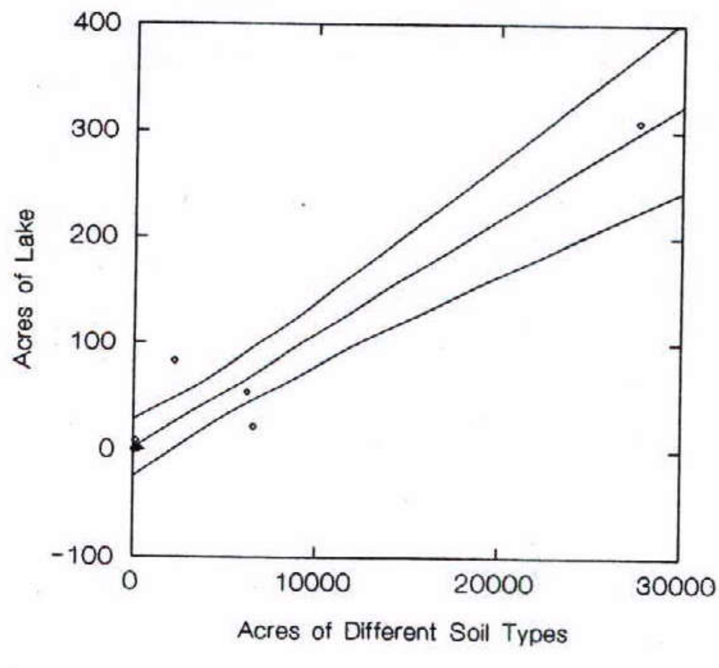
Canal Acreage vs Soil Type Acreage



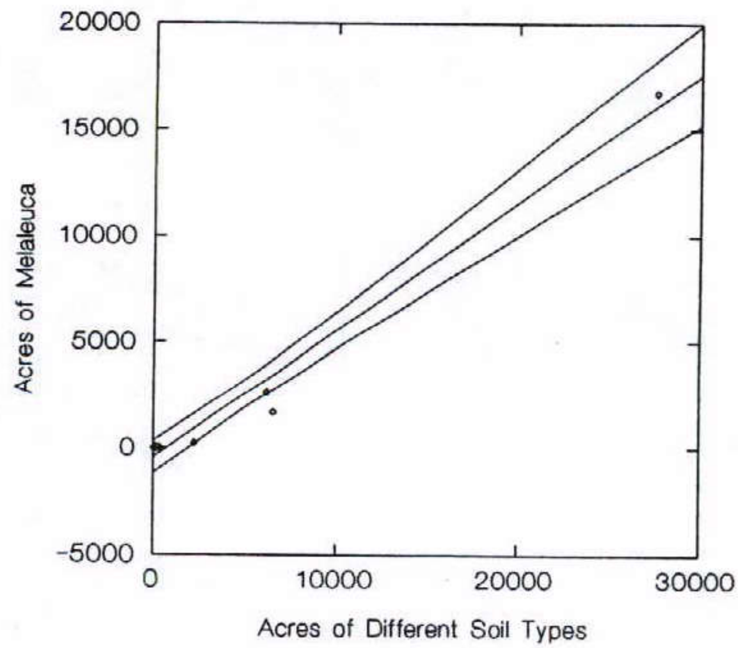
Developed Acreage vs Soil Type Acreage



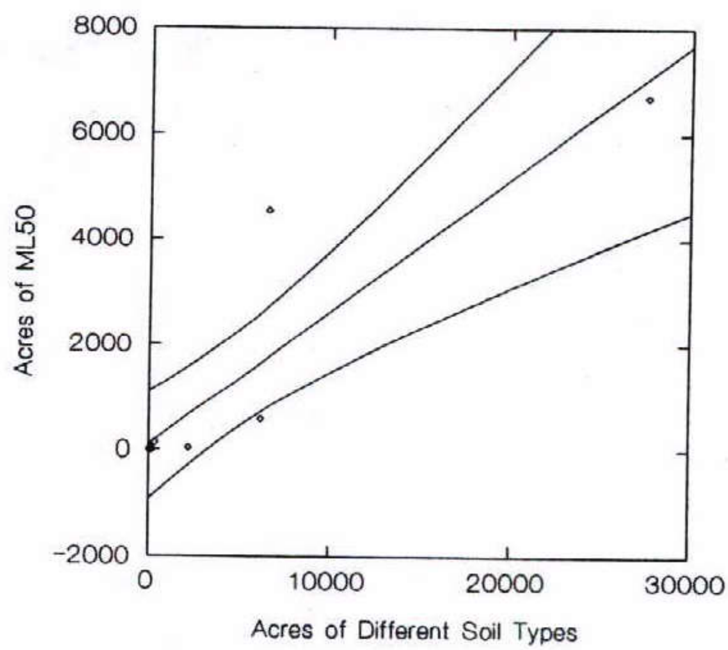
Lake Acreage vs Soil Type Acreage



Melaleuca Acreage vs Soil Type Acreage

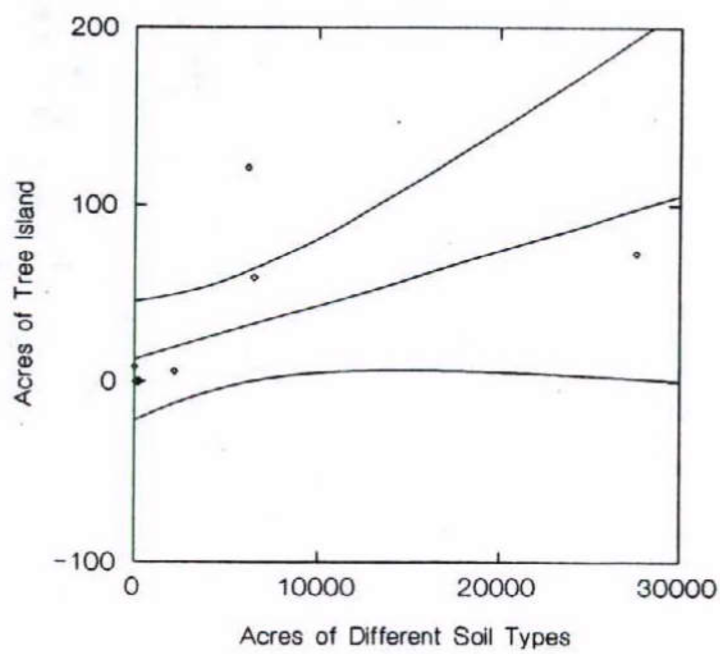


ML50 Acreage vs Soil Type Acreage



DOC#614

Tree Island Acreage vs Soil Type Acreage



APPENDIX H

Statistical Analysis: Cover Type vs. Soil Depth
Soil Depth Data from other Studies

Soil Depth vs. Cover Type

ANOVA

```
THU 3/28/96 12:57:43   C:\SYSTATW5\9338\SOILDEPT.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 COVER$
  dm         dms         p          p50        p75        ti
----------------------------------------------------------------------------------

 NUMBER OF CASES PROCESSED =        100
 MEANS MODEL.

 DEP VAR:   DEPTH     N:    100  MULTIPLE R: 0.708  SQUARED MULTIPLE R: 0.502

                      UNWEIGHTED MEANS MODEL
                       ANALYSIS OF VARIANCE

 SOURCE      SUM-OF-SQUARES   DF  MEAN-SQUARE    F-RATIO       P

 COVER$         23230.6799     5    4646.1360    18.9218     0.0000

 ERROR          23081.1992    94     245.5447

----------------------------------------------------------------------------------
----------------------------------------------------------------------------------
 LEAST SQUARES MEANS.

                                 LS MEAN          SE        N
       COVER$    =dm             62.4840      4.9552       10

       COVER$    =dms            41.6560      4.9552       10

       COVER$    =p              78.0267      4.0459       15

       COVER$    =p50            90.7858      2.7278       33

       COVER$    =p75            88.6460      4.9552       10

       COVER$    =ti             86.0918      3.3408       22
```

Tukey Pairwise

Post Hoc Comparison

```
THU 3/28/96 12:59:23   C:\SYSTATW5\9338\SOILDEPT.SYS
 COL/
 ROW   COVER$
   1   dm
   2   dms
   3   p
   4   p50
   5   p75
   6   ti

 USING UNWEIGHTED MEANS.

 POST HOC TEST OF      DEPTH

----------------------------------------------------------------------------------
 USING MODEL MSE OF       245.545 WITH       94. DF.
 MATRIX OF PAIRWISE MEAN DIFFERENCES:

                   1            2            3            4            5            6

       1        0.0000
       2      -20.8280       0.0000
       3       15.5427      36.3707       0.0000
       4       28.3018      49.1298      12.7591       0.0000
       5       26.1620      46.9900      10.6193      -2.1398       0.0000
       6       23.6078      44.4358       8.0652      -4.6939      -2.5542       0.0000

 TUKEY HSD MULTIPLE COMPARISONS.
 MATRIX OF PAIRWISE COMPARISON PROBABILITIES:

                   1            2            3            4            5            6

       1        1.0000
       2        0.0424       1.0000
       3        0.1569       0.0001       1.0000
       4        0.0002       0.0001       0.1039       1.0000
       5        0.0044       0.0001       0.5615       0.9990       1.0000
       6        0.0021       0.0001       0.6415       0.8849       0.9982       1.0000
```

THU 3/28/96 12:39:08 C:\SYSTATW5\9336\SOILDEPT.SYS

		DEPTH	STATION$
CASE	1	76.20	p1
CASE	2	88.90	p1
CASE	3	76.20	p1
CASE	4	78.74	p1
CASE	5	78.74	p1
CASE	6	76.20	p2
CASE	7	83.82	p2
CASE	8	71.12	p2
CASE	9	65.58	p2
CASE	10	83.82	p2
CASE	11	55.80	p3
CASE	12	91.44	p3
CASE	13	78.74	p3
CASE	14	91.44	p3
CASE	15	73.66	p3
CASE	16	63.50	p501
CASE	17	83.82	p501
CASE	18	71.12	p501
CASE	19	76.20	p501
CASE	20	76.20	p501
CASE	21	60.96	p502
CASE	22	78.74	p502
CASE	23	83.82	p502
CASE	24	78.74	p502
CASE	25	76.20	p502
CASE	26	83.82	p503
CASE	27	76.20	p503
CASE	28	93.98	p503
CASE	29	91.44	p503
CASE	30	81.28	p503
CASE	31	93.98	p752
CASE	32	83.82	p752
CASE	33	86.36	p752
CASE	34	96.52	p752
CASE	35	86.36	p752
CASE	36	78.74	p753
CASE	37	86.36	p753
CASE	38	88.90	p753
CASE	39	96.52	p753
CASE	40	88.90	p753
CASE	41	58.42	dms3
CASE	42	55.88	dms3
CASE	43	53.34	dms3
CASE	44	55.88	dms3
CASE	45	58.42	dms3
CASE	46	21.59	dms1
CASE	47	22.86	dms1
CASE	48	34.29	dms1
CASE	49	25.40	dms1
CASE	50	30.48	dms1
CASE	51	43.18	dm2
CASE	52	43.18	dm2
CASE	53	48.26	dm2
CASE	54	38.10	dm2
CASE	55	73.66	dm2
CASE	56	104.14	p50eas
CASE	57	96.52	p50eas
CASE	58	88.90	p50eas
CASE	59	90.17	p50eas
CASE	60	96.52	p50eas
CASE	61	83.82	p50eas
CASE	62	99.06	p50eas
CASE	63	111.76	p50eas
CASE	64	91.44	p50eas
CASE	65	93.98	p50eas
CASE	66	110.49	p50eas
CASE	67	109.22	p50eas
CASE	68	116.84	p50eas
CASE	69	102.87	p50eas
CASE	70	111.76	p50eas
CASE	71	99.06	p50eas
CASE	72	101.60	p50eas
CASE	73	111.76	p50eas
CASE	74	50.00	ti45359
CASE	75	60.00	ti45359
CASE	76	70.00	ti45359
CASE	77	75.00	ti45359

CASE	78	50.00	ti45359
CASE	79	80.00	ti45359
CASE	80	100.00	ti45359
CASE	81	100.00	ti45359
CASE	82	100.00	ti45359
CASE	83	90.00	ti45359
CASE	84	70.00	ti45359
CASE	85	115.57	ti215339
CASE	86	132.08	ti215339
CASE	87	91.44	ti215339
CASE	88	86.36	ti215339
CASE	89	130.81	ti215339
CASE	90	81.28	ti215339
CASE	91	88.90	ti215339
CASE	92	83.82	ti215339
CASE	93	78.74	ti215339
CASE	94	73.66	ti215339
CASE	95	86.36	ti215339
CASE	96	76.20	dm3
CASE	97	73.66	dm3
CASE	98	76.20	dm3
CASE	99	73.66	dm3
CASE	100	78.74	dm3

100 CASES AND 2 VARIABLES PROCESSED.

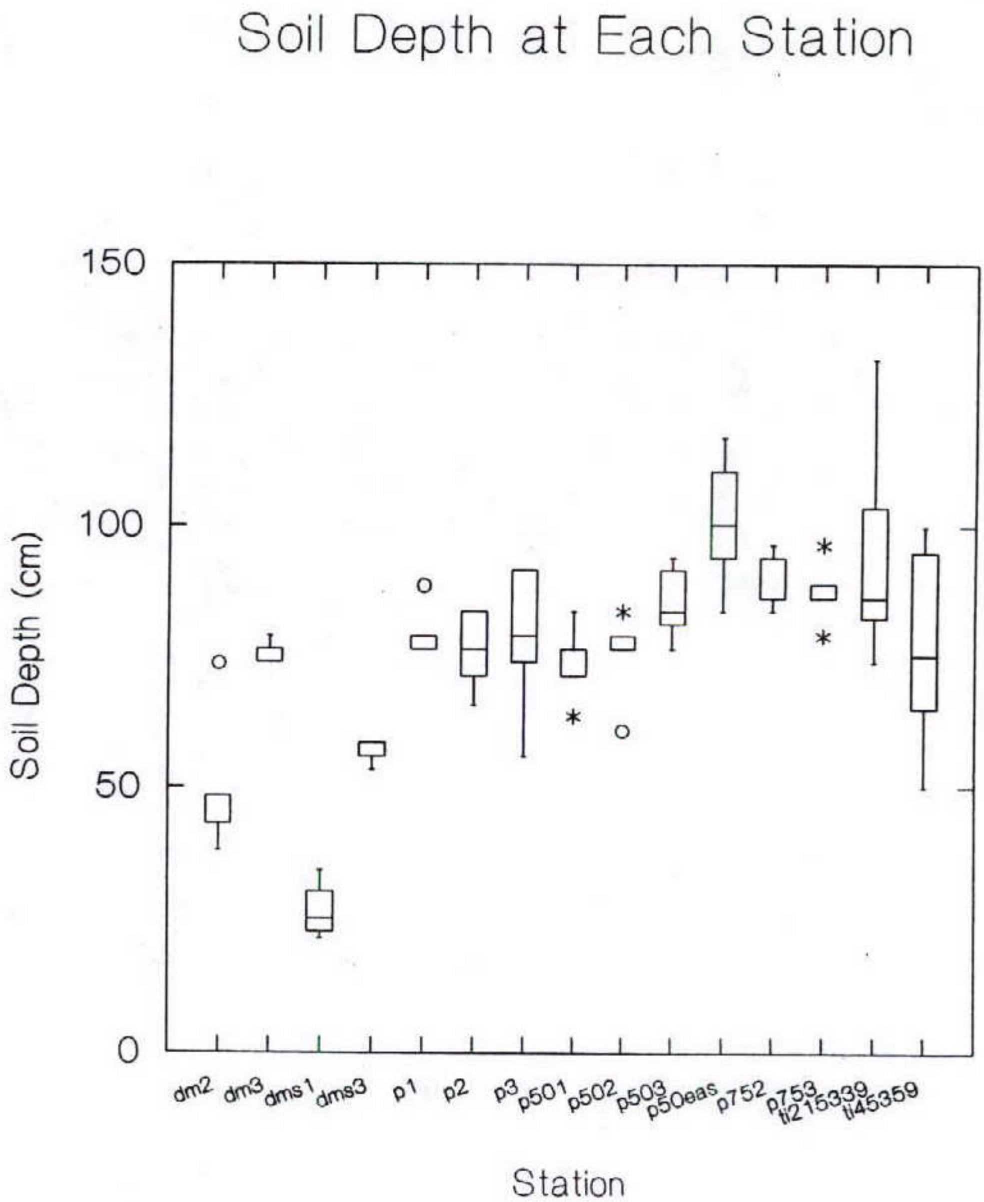
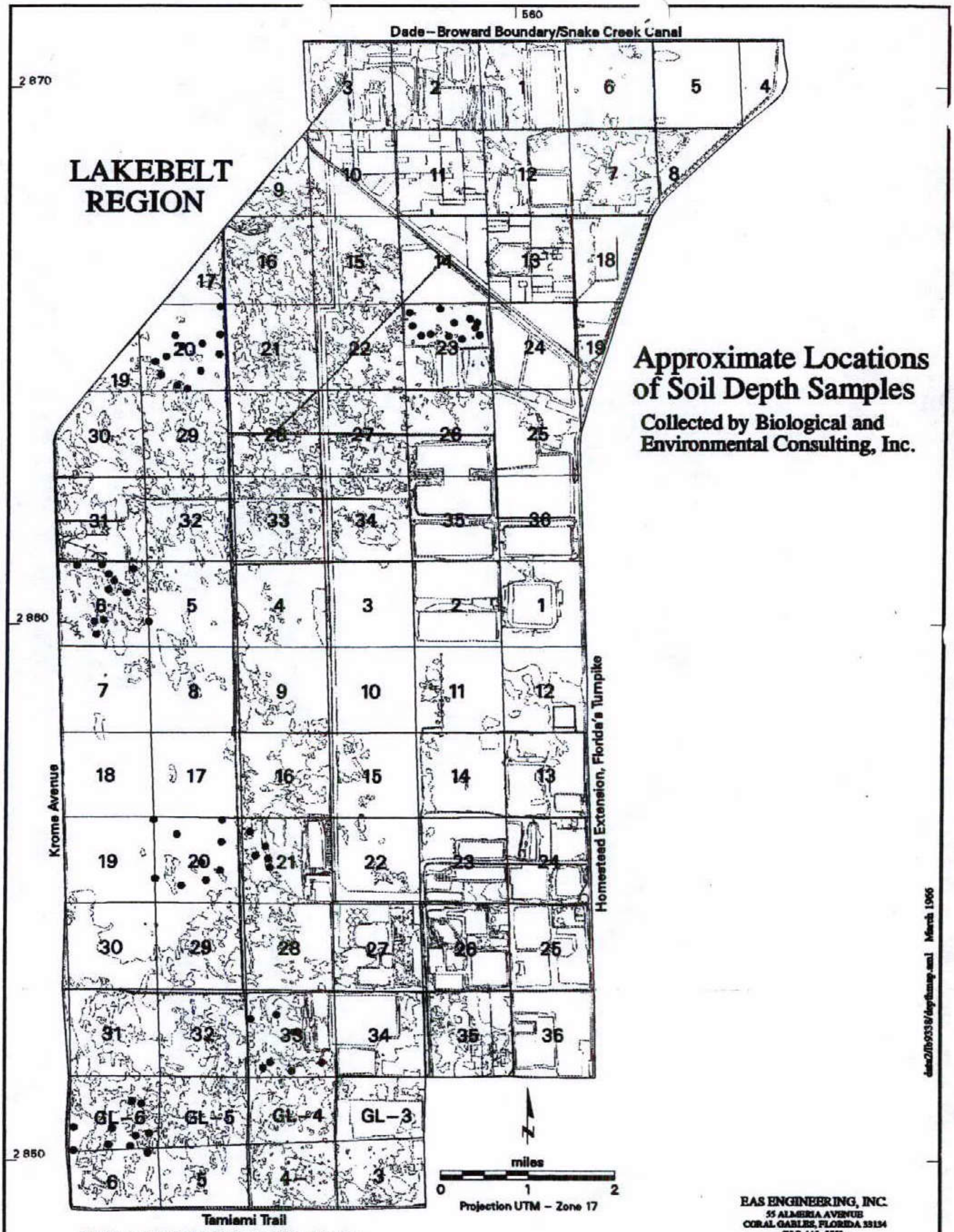

Soil Depth at Each Station
150
100
50
0
Soil Depth (cm)
dm2
dm3
dms1
dms3
p1
p2
p3
p501
p502
p503
p50eas
p752
p753
ti215339
ti45359
Station

Table 2 Data From Other Studies

Soil Depths(cm) by Section Township Range

									Tree Islands	
S-T-R	20-52-39	23-52-39	L6-53-39	20-53-39	21-53-39	33-53-39	6-53-39	16-53-39	21-53-39	4-53-39
Average	73.05	47.94	84.75	97.67	79.66	69.56	83.25	101.29	93.84	76.82
Min	55.00	25.00	50.00	50.00	50.00	36.00	45.00	83.87	70.97	50.00
Max	100.00	75.00	100.00	170.00	115.00	91.00	125.00	116.13	129.03	100.00



LAKEBELT REGION
Approximate Locations of Soil Depth Samples
Collected by Biological and Environmental Consulting, Inc.
Dade–Broward Boundary/Snake Creek Canal
560
2 870
2 860
2 850
Krome Avenue
Homestead Extension, Florida's Turnpike
Tamiami Trail
GL–6
GL–5
GL–4
GL–3
miles
0
1
2
Projection UTM – Zone 17
Data Sources: Biological and Environmental Consulting, Inc.;
Dade County Aerial Photographs (1992, 1994)
EAS ENGINEERING, INC.
55 ALMERIA AVENUE
CORAL GABLES, FLORIDA 33134
(305) 445-5553
FAX (305) 444-2112
March 1995

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 20	52 S	39 E	55
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	85
S 20	52 S	39 E	85
S 20	52 S	39 E	90
S 20	52 S	39 E	90
S 20	52 S	39 E	100
S 20	52 S	39 E	55
S 20	52 S	39 E	55
S 20	52 S	39 E	55
S 20	52 S	39 E	55
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	65

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	85
S 20	52 S	39 E	85
S 20	52 S	39 E	95
S 20	52 S	39 E	95
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	60
S 20	52 S	39 E	65
S 20	52	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	80
S 20	52 S	39 E	80

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 20	52 S	39 E	80
S 20	52 S	39 E	85
S 20	52 S	39 E	90
S 20	52 S	39 E	90
S 20	52 S	39 E	100
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	65
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	70
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	75
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	80
S 20	52 S	39 E	85
S 20	52 S	39 E	85
S 20	52 S	39 E	85
S 20	52 S	39 E	85
S 20	52 S	39 E	85
S 20	52 S	39 E	85
S 20	52 S	39 E	90
S 20	52 S	39 E	90
S 20	52 S	39 E	90
S 20	52 S	39 E	95
S 20	52 S	39 E	95
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S □3	52 S	39 E	50
S 23	52 S	39 E	50

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 23	52 S	39 E	60
S 23	52 S	39 E	60
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	25
S 23	52 S	39 E	25
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	50

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 23	52 S	39 E	50
S 23	52 S	39 E	55
S 23	52 S	39 E	55
S 23	52 S	39 E	60
S 23	52 S	39 E	60
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	70
S 23	52 S	39 E	70
S 23	52 S	39 E	70
S 23	52 S	39 E	25
S 23	52 S	39 E	25
S 23	52 S	39 E	30
S 23	52 S	39 E	30
S 23	52 S	39 E	30
S 23	52 S	39 E	30
S 23	52 S	39 E	30
S 23	52 S	39 E	30
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	35
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	40
S 23	52 S	39 E	45
S 23	52 S	39 E	45
S 23	52 S	39 E	50
S 23	52 S	39 E	50

LAKE BELT SOIL DEPTH DATA
06/30/95

File:	LB_S1_SO.WB2		
Section/Lot	Township	Range	Soil Depth (cm)
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	50
S 23	52 S	39 E	55
S 23	52 S	39 E	55
S 23	52 S	39 E	55
S 23	52 S	39 E	55
S 23	52 S	39 E	55
S 23	52 S	39 E	55
S 23	52 S	39 E	55
S 23	52 S	39 E	60
S 23	52 S	39 E	60
S 23	52 S	39 E	60
S 23	52 S	39 E	60
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	65
S 23	52 S	39 E	75
S 23	52 S	39 E	75
L 6	53 S	39 E	50
L 6	53 S	39 E	75
L 6	53 S	39 E	85
L 6	53 S	39 E	95
L 6	53 S	39 E	85
L 6	53 S	39 E	85
L 6	53 S	39 E	95
L 6	53 S	39 E	95
L 6	53 S	39 E	85
L 6	53 S	39 E	85
L 6	53 S	39 E	85
L 6	53 S	39 E	85
L 6	53 S	39 E	90
L 6	53 S	39 E	100
L 6	53 S	39 E	60

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
L 6	53 S	39 E	80
L 6	53 S	39 E	85
L 6	53 S	39 E	85
L 6	53 S	39 E	90
L 6	53 S	39 E	100
S 16	53 S	39 E	83.8708
S 16	53 S	39 E	90.3224
S 16	53 S	39 E	90.3224
S 16	53 S	39 E	90.3224
S 16	53 S	39 E	96.774
S 16	53 S	39 E	96.774
S 16	53 S	39 E	96.774
S 16	53 S	39 E	96.774
S 16	53 S	39 E	96.774
S 16	53 S	39 E	96.774
S 16	53 S	39 E	103.2256
S 16	53 S	39 E	103.2256
S 16	53 S	39 E	103.2256
S 16	53 S	39 E	109.6772
S 16	53 S	39 E	109.6772
S 16	53 S	39 E	109.6772
S 16	53 S	39 E	109.6772
S 16	53 S	39 E	109.6772
S 16	53 S	39 E	116.1288
S 16	53 S	39 E	116.1288
S 20	53 S	39 E	70
S 20	53 S	39 E	80
S 20	53 S	39 E	85
S 20	53 S	39 E	85
S 20	53 S	39 E	90
S 20	53 S	39 E	90
S 20	53 S	39 E	90
S 20	53 S	39 E	95
S 20	53 S	39 E	95
S 20	53 S	39 E	95
S 20	53 S	39 E	95
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	105
S 20	53 S	39 E	110

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 20	53 S	39 E	110
S 20	53 S	39 E	110
S 20	53 S	39 E	110
S 20	53 S	39 E	115
S 20	53 S	39 E	120
S 20	53 S	39 E	120
S 20	53 S	39 E	120
S 20	53 S	39 E	120
S 20	53 S	39 E	120
S 20	53 S	39 E	130
S 20	53 S	39 E	135
S 20	53 S	39 E	150
S 20	53 S	39 E	170
S 20	53 S	39 E	50
S 20	53 S	39 E	50
S 20	53 S	39 E	50
S 20	53 S	39 E	55
S 20	53 S	39 E	60
S 20	53 S	39 E	60
S 20	53 S	39 E	60
S 20	53 S	39 E	60
S 20	53 S	39 E	60
S 20	53 S	39 E	65
S 20	53 S	39 E	70
S 20	53 S	39 E	70
S 20	53 S	39 E	75
S 20	53 S	39 E	85
S 20	53 S	39 E	85
S 20	53 S	39 E	90
S 20	53 S	39 E	90
S 20	53 S	39 E	90
S 20	53 S	39 E	95
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	105
S 20	53 S	39 E	110
S 20	53 S	39 E	110
S 20	53 S	39 E	110
S 20	53 S	39 E	115
S 20	53 S	39 E	120

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 20	53 S	39 E	125
S 20	53 S	39 E	75
S 20	53 S	39 E	80
S 20	53 S	39 E	85
S 20	53 S	39 E	85
S 20	53 S	39 E	85
S 20	53 S	39 E	85
S 20	53 S	39 E	90
S 20	53 S	39 E	90
S 20	53 S	39 E	90
S 20	53 S	39 E	90
S 20	53 S	39 E	95
S 20	53 S	39 E	95
S 20	53 S	39 E	95
S 20	53 S	39 E	95
S 20	53 S	39 E	95
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	100
S 20	53 S	39 E	105
S 20	53 S	39 E	105
S 20	53 S	39 E	110
S 20	53 S	39 E	110
S 20	53 S	39 E	110
S 20	53 S	39 E	110
S 20	53 S	39 E	120
S 20	53 S	39 E	130
S 20	53 S	39 E	130
S 20	53 S	39 E	150
S 20	53 S	39 E	150
S 21	53 S	39 E	55
S 21	53 S	39 E	60
S 21	53 S	39 E	65
S 21	53 S	39 E	70
S 21	53 S	39 E	70
S 21	53 S	39 E	70
S 21	53 S	39 E	75
S 21	53 S	39 E	75
S 21	53 S	39 E	75
S 21	53 S	39 E	80
S 21	53 S	39 E	80

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	85
S 21	53 S	39 E	85
S 21	53 S	39 E	85
S 21	53 S	39 E	85
S 21	53 S	39 E	85
S 21	53 S	39 E	90
S 21	53 S	39 E	90
S 21	53 S	39 E	90
S 21	53 S	39 E	95
S 21	53 S	39 E	95
S 21	53 S	39 E	100
S 21	53 S	39 E	100
S 21	53 S	39 E	115
S 21	53 S	39 E	50
S 21	53 S	39 E	50
S 21	53 S	39 E	50
S 21	53 S	39 E	55
S 21	53 S	39 E	60
S 21	53 S	39 E	65
S 21	53 S	39 E	65
S 21	53 S	39 E	65
S 21	53 S	39 E	65
S 21	53 S	39 E	70
S 21	53 S	39 E	75
S 21	53 S	39 E	75
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	80
S 21	53 S	39 E	85
S 21	53 S	39 E	85
S 21	53 S	39 E	85
S 21	53 S	39 E	85
S 21	53 S	39 E	90
S 21	53 S	39 E	90

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 21	53 S	39 E	90
S 21	53 S	39 E	90
S 21	53 S	39 E	95
S 21	53 S	39 E	95
S 21	53 S	39 E	100
S 21	53 S	39 E	110
S 21	53 S	39 E	70.9676
S 21	53 S	39 E	77.4192
S 21	53 S	39 E	77.4192
S 21	53 S	39 E	83.8708
S 21	53 S	39 E	83.8708
S 21	53 S	39 E	83.8708
S 21	53 S	39 E	90.3224
S 21	53 S	39 E	90.3224
S 21	53 S	39 E	116.1288
S 21	53 S	39 E	129.032
S 21	53 S	39 E	129.032
S 33	53 S	39 E	36
S 33	53 S	39 E	43
S 33	53 S	39 E	46
S 33	□3 S	39 E	50
S 33	53 S	39 E	51
S 33	53 S	39 E	53
S 33	53 S	39 E	56
S 33	53 S	39 E	56
S 33	53 S	39 E	56
S 33	53 S	39 E	56
S 33	53 S	39 E	58
S 33	53 S	39 E	58
S 33	53 S	39 E	61
S 33	53 S	39 E	61
S 33	53 S	39 E	64
S 33	53 S	39 E	64
S 33	53 S	39 E	66
S 33	53 S	39 E	66
S 33	53 S	39 E	69
S 33	53 S	39 E	71
S 33	53 S	39 E	74
S 33	53 S	39 E	74
S 33	53 S	39 E	74
S 33	53 S	39 E	76
S 33	53 S	39 E	76

LAKE BELT SOIL DEPTH DATA

06/30/95

File:	LB_S1_SO.WB2		
Section/Lot	Township	Range	Soil Depth (cm)
S 33	53 S	39 E	79
S 33	53 S	39 E	79
S 33	53 S	39 E	84
S 33	53 S	39 E	84
S 33	53 S	39 E	86
S 33	53 S	39 E	89
S 33	53 S	39 E	89
S 33	53 S	39 E	89
S 33	53 S	39 E	91
S 33	53 S	39 E	48
S 33	53 S	39 E	53
S 33	53 S	39 E	56
S 33	53 S	39 E	58
S 33	53 S	39 E	61
S 33	53 S	39 E	64
S 33	53 S	39 E	66
S 33	53 S	39 E	69
S 33	53 S	39 E	69
S 33	53 S	39 E	71
S 33	53 S	39 E	71
S 33	53 S	39 E	71
S 33	53 S	39 E	71
S 33	53 S	39 E	71
S 33	53 S	39 E	74
S 33	53 S	39 E	76
S 33	53 S	39 E	76
S 33	53 S	39 E	76
S 33	53 S	39 E	76
S 33	53 S	39 E	76
S 33	53 S	39 E	76
S 33	53 S	39 E	76
S 33	53 S	39 E	79
S 33	53 S	39 E	79
S 33	53 S	39 E	79
S 33	53 S	39 E	81
S 33	53 S	39 E	81
S 33	53 S	39 E	81
S 33	53 S	39 E	81
S 33	53 S	39 E	81
S 33	53 S	39 E	48
S 33	53 S	39 E	51
S 33	53 S	39 E	53

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 33	53 S	39 E	56
S 33	53 S	39 E	58
S 33	53 S	39 E	61
S 33	53 S	39 E	64
S 33	53 S	39 E	64
S 33	53 S	39 E	64
S 33	53 S	39 E	66
S 33	53 S	39 E	69
S 33	53 S	39 E	69
S 33	53 S	39 E	71
S 33	53 S	39 E	74
S 33	53 S	39 E	74
S 33	53 S	39 E	74
S 33	53 S	39 E	76
S 33	53 S	39 E	76
S 33	53 S	39 E	79
S 33	53 S	39 E	79
S 33	53 S	39 E	79
S 33	53 S	39 E	81
S 33	53 S	39 E	81
S 33	53 S	39 E	86
S 33	53 S	39 E	86
S 33	53 S	39 E	89
S 4	53 S	39 E	50
S 4	53 S	39 E	50
S 4	53 S	39 E	60
S 4	53 S	39 E	70
S 4	53 S	39 E	70
S 4	53 S	39 E	75
S 4	53 S	39 E	80
S 4	53 S	39 E	90
S 4	53 S	39 E	100
S 4	53 S	39 E	100
S 4	53 S	39 E	100
S 6	53 S	39 E	45
S 6	53 S	39 E	45
S 6	53 S	39 E	45
S 6	53 S	39 E	45
S 6	53 S	39 E	45
S 6	53 S	39 E	50
S 6	53 S	39 E	50
S 6	53 S	39 E	55

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 6	53 S	39 E	55
S 6	53 S	39 E	55
S 6	53 S	39 E	55
S 6	53 S	39 E	60
S 6	53 S	39 E	60
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	70
S 6	53 S	39 E	70
S 6	53 S	39 E	75
S 6	53 S	39 E	80
S 6	53 S	39 E	80
S 6	53 S	39 E	85
S 6	53 S	39 E	85
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	105
S 6	53 S	39 E	110
S 6	□3 S	39 E	110
S 6	53 S	39 E	125
S 6	53 S	39 E	55
S 6	53 S	39 E	55
S 6	53 S	39 E	60
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	70
S 6	53 S	39 E	70
S 6	53 S	39 E	70
S 6	53 S	39 E	80
S 6	53 S	39 E	80
S 6	53 S	39 E	80
S 6	53 S	39 E	80
S 6	53 S	39 E	85
S 6	53 S	39 E	85
S 6	53 S	39 E	85

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 6	53 S	39 E	90
S 6	53 S	39 E	90
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	100
S 6	53 S	39 E	105
S 6	53 S	39 E	110
S 6	53 S	39 E	115
S 6	53 S	39 E	120
S 6	53 S	39 E	50
S 6	53 S	39 E	60
S 6	53 S	39 E	60
S 6	53 S	39 E	60
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	65
S 6	53 S	39 E	75
S 6	53 S	39 E	75
S 6	53 S	39 E	75
S 6	53 S	39 E	75
S 6	53 S	39 E	75
S 6	53 S	39 E	80
S 6	53 S	39 E	85
S 6	53 S	39 E	90
S 6	53 S	39 E	90
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	105
S 6	53 S	39 E	110
S 6	53 S	39 E	75
S 6	53 S	39 E	75

LAKE BELT SOIL DEPTH DATA

06/30/95

File: LB_S1_SO.WB2

Section/Lot	Township	Range	Soil Depth (cm)
S 6	53 S	39 E	85
S 6	53 S	39 E	85
S 6	53 S	39 E	90
S 6	53 S	39 E	90
S 6	53 S	39 E	90
S 6	53 S	39 E	90
S 6	53 S	39 E	90
S 6	53 S	39 E	90
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	95
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	100
S 6	53 S	39 E	105
S 6	53 S	39 E	105
S 6	53 S	39 E	105
S 6	53 S	39 E	105
S 6	53 S	39 E	105
S 6	53 S	39 E	105
S 6	53 S	39 E	110
S 6	53 S	39 E	110
S 6	53 S	39 E	115

APPENDIX I

Statistical Analysis: Cover Type vs. Ground Elevation

COVER TYPE VS. ELEVATION

WED 3/20/96 15:35:49 C:\SYSTATW5\9338\ELEV

		ACRES	C	D	ELEV$	L	M	ML50
CASE	1	52.74	0.00	4.10	2 feet	13.02	35.62	0.00
CASE	2	866.90	0.00	103.42	3 feet	342.00	421.48	0.00
CASE	3	24452.09	79.88	4925.64	4 feet	4006.26	12720.44	2551.37
CASE	4	14785.24	60.36	241.79	5 feet	18.74	4990.17	9422.04

4 CASES AND 7 VARIABLES PROCESSED.
NO SYSTAT FILE CREATED.

WED 3/20/96 15:36:33 C:\SYSTATW5\9338\ELEV

M

MODEL CONTAINS NO CONSTANT.

DEP VAR: M N: 4 MULTIPLE R: 0.986 SQUARED MULTIPLE R: 0.971
ADJUSTED SQUARED MULTIPLE R: .971 STANDARD ERROR OF ESTIMATE: 1334.6708

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
ACRES	0.4713	0.0467	0.9856	1.0000	10.0953	0.0021

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.181546E+09	1	.181546E+09	101.9152	0.0021
RESIDUAL	.534404E+07	3	.178135E+07		

WED 3/20/96 15:36:50 C:\SYSTATW5\9338\ELEV

ML50

MODEL CONTAINS NO CONSTANT.

DEP VAR: ML50 N: 4 MULTIPLE R: 0.723 SQUARED MULTIPLE R: 0.522
ADJUSTED SQUARED MULTIPLE R: .522 STANDARD ERROR OF ESTIMATE: 3894.7864

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
ACRES	0.2468	0.1362	0.7228	1.0000	1.8115	0.1677

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.497762E+08	1	.497762E+08	3.2814	0.1677
RESIDUAL	.455081E+08	3	.151694E+08		

WED 3/20/96 15:37:02 C:\SYSTATW5\9338\ELEV

D

MODEL CONTAINS NO CONSTANT.

DEP VAR: D N: 4 MULTIPLE R: 0.880 SQUARED MULTIPLE R: 0.775
ADJUSTED SQUARED MULTIPLE R: .775 STANDARD ERROR OF ESTIMATE: 1352.1085

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
ACRES	0.1519	0.0473	0.8801	1.0000	3.2107	0.0489

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.188465E+08	1	.188465E+08	10.3088	0.0489
RESIDUAL	.548459E+07	3	.182820E+07		

CO\ R TYPE VS. ELEVATION

WED 3/20/96 15:37:12 C:\SYSTATW5\9338\ELEV

L

MODEL CONTAINS NO CONSTANT.

DEP VAR: L N: 4 MULTIPLE R: 0.857 SQUARED MULTIPLE R: 0.735
ADJUSTED SQUARED MULTIPLE R: .735 STANDARD ERROR OF ESTIMATE: 1195.4576

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
ACRES	0.1206	0.0418	0.8572	1.0000	2.8832	0.0634

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.118802E+08	1	.118802E+08	8.3130	0.0634
RESIDUAL	.428736E+07	3	.142912E+07		

WED 3/20/96 15:37:22 C:\SYSTATW5\9338\ELEV

C

MODEL CONTAINS NO CONSTANT.

DEP VAR: C N: 4 MULTIPLE R: 0.994 SQUARED MULTIPLE R: 0.988
ADJUSTED SQUARED MULTIPLE R: .988 STANDARD ERROR OF ESTIMATE: 6.2089

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
ACRES	0.0035	0.0002	0.9942	1.0000	16.0321	0.0005

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	9908.4929	1	9908.4929	257.0272	0.0005
RESIDUAL	115.6511	3	38.5504		

WED 3/20/96 16:33:26 C:\SYSTATW5\9338\ELEV

TI

		ACRES	ELEV$	TI
CASE	1	52.74	2 feet	0.00
CASE	2	866.90	3 feet	0.00
CASE	3	24452.09	4 feet	168.50
CASE	4	14785.24	5 feet	52.14

4 CASES AND 8 VARIABLES PROCESSED.
NO SYSTAT FILE CREATED.

WED 3/20/96 16:33:54 C:\SYSTATW5\9338\ELEV

MODEL CONTAINS NO CONSTANT.

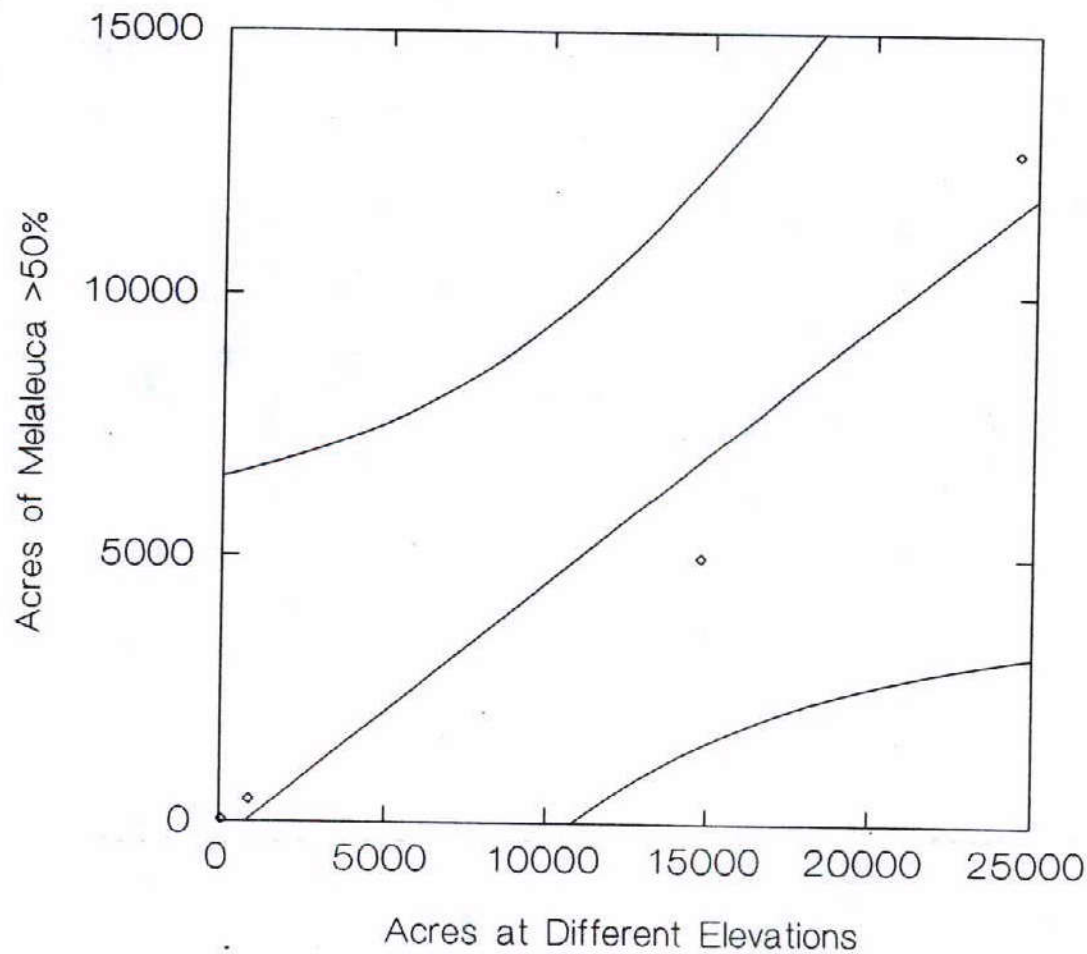
DEP VAR: TI N: 4 MULTIPLE R: 0.970 SQUARED MULTIPLE R: 0.941
ADJUSTED SQUARED MULTIPLE R: .941 STANDARD ERROR OF ESTIMATE: 24.7597

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
ACRES	0.0060	0.0009	0.9700	1.0000	6.9100	0.0062

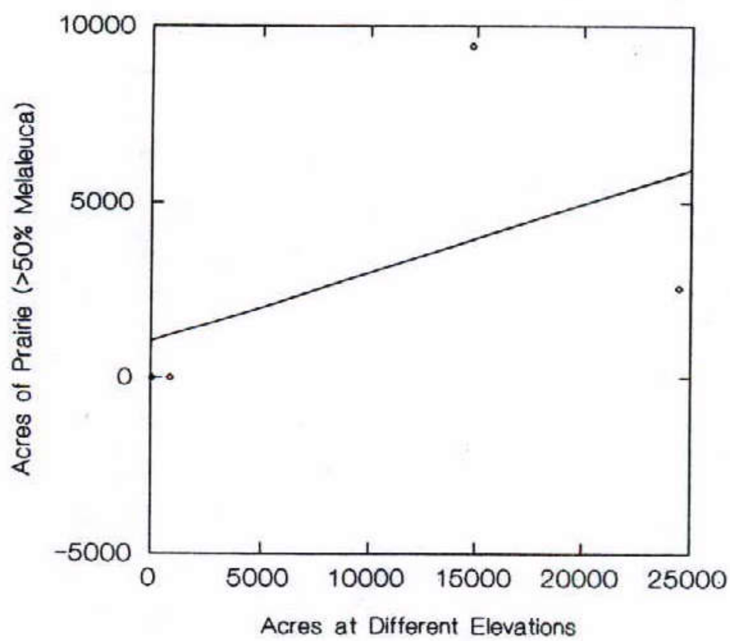
ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	29271.7023	1	29271.7023	47.7482	0.0062
RESIDUAL	1839.1273	3	613.0424		

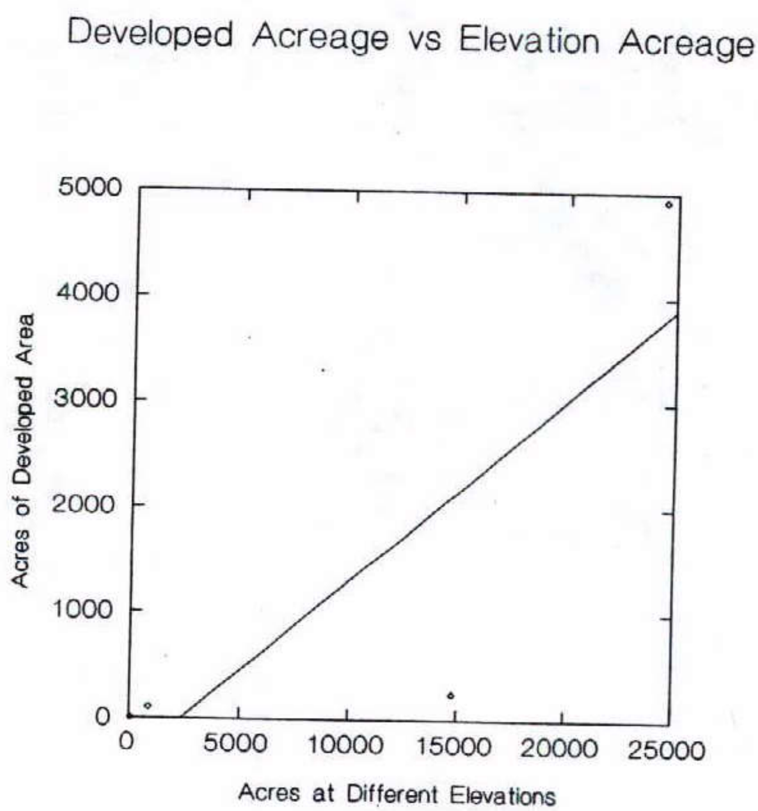
Melaleuca Acreage vs Elevation Acreage



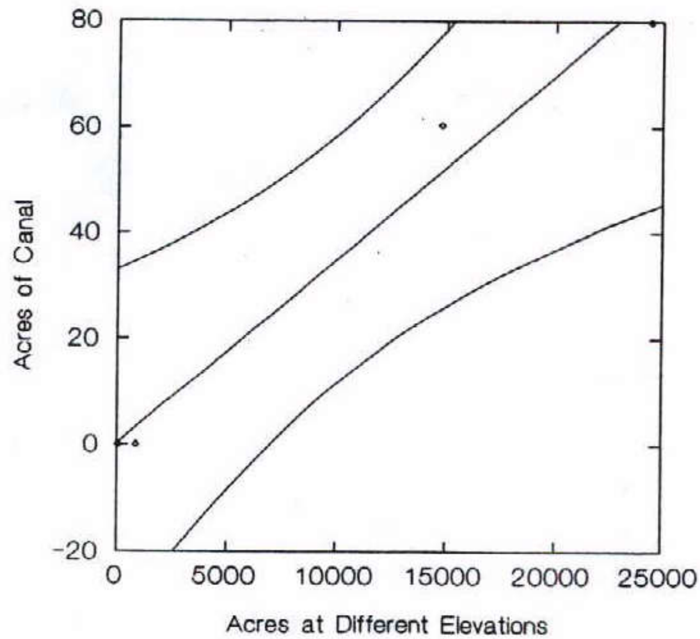
Prairie Acreage vs Elevation Acreage



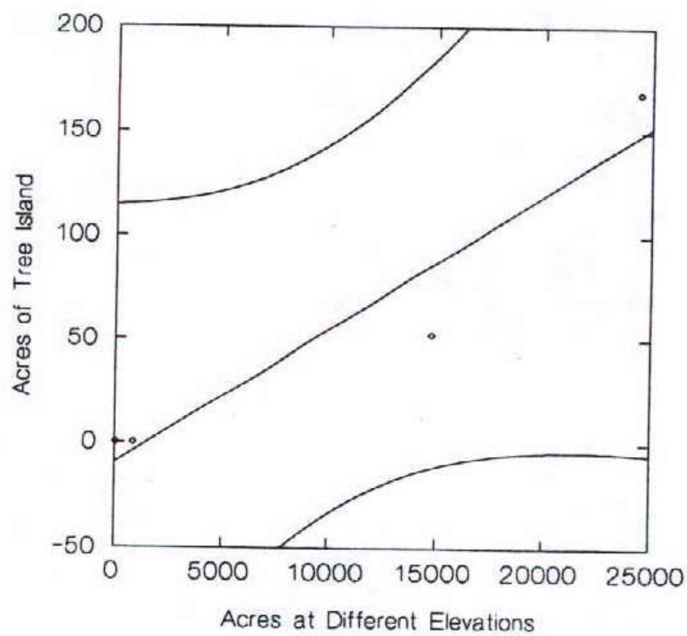
DOC#614


Developed Acreage vs Elevation Acreage
Acres of Developed Area
0
1000
2000
3000
4000
5000
0
5000
10000
15000
20000
25000
Acres at Different Elevations

Canal Acreage vs Elevation Acreage



Tree Island Acreage vs Elevation Acreage



DOC#614

APPENDIX J

Statistical Analysis: Ground Elevation vs. Time

Groundwater Elevation vs. Time

WED 3/13/96 17:04:57 C:\SYSTATW5\9338\HYDRODAT.SYS
8 CASES DELETED DUE TO MISSING DATA.

G-1488

DEP VAR: G1488 N: 22 MULTIPLE R: 0.260 SQUARED MULTIPLE R: 0.068
ADJUSTED SQUARED MULTIPLE R: .021 STANDARD ERROR OF ESTIMATE: 0.515684220

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	.473842E+02	.343389E+02	0.000000000	.	1.37990	0.18285
YEAR	-0.020892151	0.017329641	-0.260282799	.100E+01	-1.20557	0.24205

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.386504800	1	0.386504800	1.453406865	0.242052208
RESIDUAL	5.318604291	20	0.265930215		

WED 3/13/96 17:05:36 C:\SYSTATW5\9338\HYDRODAT.SYS
11 CASES DELETED DUE TO MISSING DATA.

G-970

DEP VAR: G970 N: 19 MULTIPLE R: 0.454 SQUARED MULTIPLE R: 0.206
ADJUSTED SQUARED MULTIPLE R: .160 STANDARD ERROR OF ESTIMATE: 0.158966476

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	.305799E+02	.132036E+02	0.000000000	.	2.31603	0.03330
YEAR	-0.014000000	0.006658373	-0.454297258	.100E+01	-2.10262	0.05070

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.111720000	1	0.111720000	4.420993051	0.050702428
RESIDUAL	0.429595789	17	0.025270341		

WED 3/13/96 17:05:55 C:\SYSTATW5\9338\HYDRODAT.SYS

G-972

DEP VAR: G972 N: 30 MULTIPLE R: 0.001 SQUARED MULTIPLE R: 0.000
ADJUSTED SQUARED MULTIPLE R: .000 STANDARD ERROR OF ESTIMATE: 0.472672145

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	4.704482017	.197165E+02	0.000000000	.	0.23861	0.81315
YEAR	0.000051168	0.009970344	0.000969859	.100E+01	0.00513	0.99594

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.000005884	1	0.000005884	0.000026338	0.995941652
RESIDUAL	6.255730782	28	0.223418957		

Groundwater Elevation vs. Time

WED 3/13/96 17:06:24 C:\SYSTATW5\9338\HYDRODAT.SYS

G-974

DEP VAR: G974 N: 30 MULTIPLE R: 0.854 SQUARED MULTIPLE R: 0.730
ADJUSTED SQUARED MULTIPLE R: .720 STANDARD ERROR OF ESTIMATE: 0.570563999

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	.210569E+03	.237999E+02	0.000000000	.	8.84748	0.00000
YEAR	-0.104598443	0.012035233	-0.854141060	.100E+01	-8.69102	0.00000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.245895E+02	1	.245895E+02	.755338E+02	0.000000002
RESIDUAL	9.115211761	28	0.325543277		

WED 3/13/96 17:06:37 C:\SYSTATW5\9338\HYDRODAT.SYS

G-975

DEP VAR: G975 N: 30 MULTIPLE R: 0.644 SQUARED MULTIPLE R: 0.415
ADJUSTED SQUARED MULTIPLE R: .394 STANDARD ERROR OF ESTIMATE: 0.558820778

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	.109454E+03	.233101E+02	0.000000000	.	4.69555	0.00006
YEAR	-0.052502781	0.011787527	-0.643974514	.100E+01	-4.45410	0.00012

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	6.195328142	1	6.195328142	.198390E+02	0.000123117
RESIDUAL	8.743858524	28	0.312280662		

WED 3/13/96 17:06:49 C:\SYSTATW5\9338\HYDRODAT.SYS

G-976

DEP VAR: G976 N: 30 MULTIPLE R: 0.788 SQUARED MULTIPLE R: 0.622
ADJUSTED SQUARED MULTIPLE R: .608 STANDARD ERROR OF ESTIMATE: 0.663112576

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	.192144E+03	.276604E+02	0.000000000	.	6.94653	0.00000
YEAR	-0.094863181	0.013987414	-0.788417038	.100E+01	-6.78204	0.00000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.202253E+02	1	.202253E+02	.459961E+02	0.000000229
RESIDUAL	.123121E+02	28	0.439718289		

Well Data vs Time (1963-1980 only)

THU 3/21/96 10:24:37 C:\SYSTATW5\9338\HYDRODAT.SYS
12 CASES DELETED DUE TO MISSING DATA.

G-974

DEP VAR:G974EARL N: 18 MULTIPLE R: 0.661 SQUARED MULTIPLE R: 0.437
ADJUSTED SQUARED MULTIPLE R: .401 STANDARD ERROR OF ESTIMATE: 0.4134697

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	134.8016030	37.0335301	0.0000000	.	3.63999	0.00220
YEAREARL	-0.0661507	0.0187844	-0.6607948	.100E+01	-3.52158	0.00283

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	2.1201290	1	2.1201290	12.4015181	0.0028315
RESIDUAL	2.7353154	16	0.1709572		

THU 3/21/96 10:24:49 C:\SYSTATW5\9338\HYDRODAT.SYS
12 CASES DELETED DUE TO MISSING DATA.

G-975

DEP VAR:G975EARL N: 18 MULTIPLE R: 0.335 SQUARED MULTIPLE R: 0.112
ADJUSTED SQUARED MULTIPLE R: .057 STANDARD ERROR OF ESTIMATE: 0.4893121

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	68.2287960	43.8265532	0.0000000	.	1.55679	0.13908
YEAREARL	-0.0315893	0.0222300	-0.3347585	.100E+01	-1.42102	0.17451

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.4834737	1	0.4834737	2.0193009	0.1745072
RESIDUAL	3.8308207	16	0.2394263		

THU 3/21/96 10:25:05 C:\SYSTATW5\9338\HYDRODAT.SYS
12 CASES DELETED DUE TO MISSING DATA.

G-976

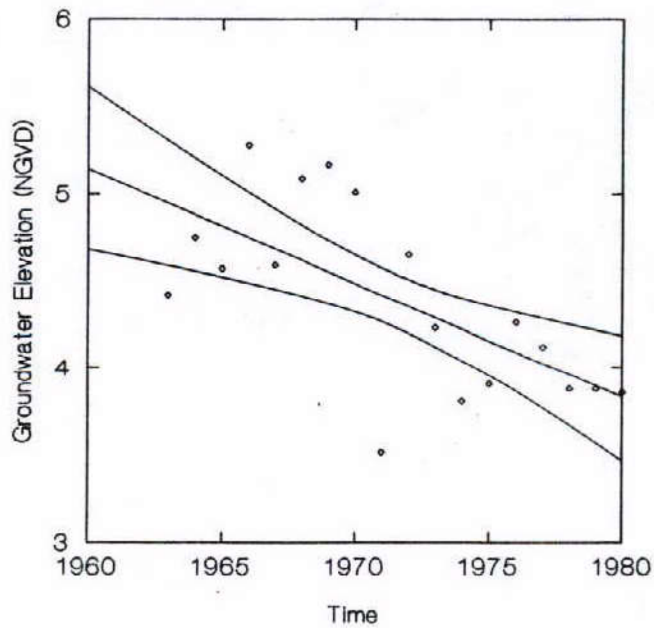
DEP VAR:G976EARL N: 18 MULTIPLE R: 0.467 SQUARED MULTIPLE R: 0.218
ADJUSTED SQUARED MULTIPLE R: .170 STANDARD ERROR OF ESTIMATE: 0.3858318

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	78.2431373	34.5580645	0.0000000	.	2.26411	0.03782
YEAREARL	-0.0370588	0.0175288	-0.4672878	.100E+01	-2.11417	0.05055

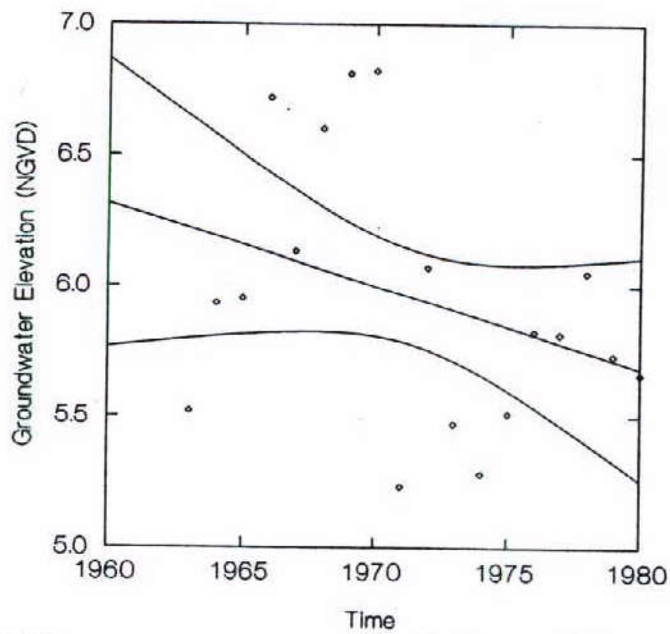
ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	0.6653912	1	0.6653912	4.4697271	0.0505519
RESIDUAL	2.3818588	16	0.1488662		

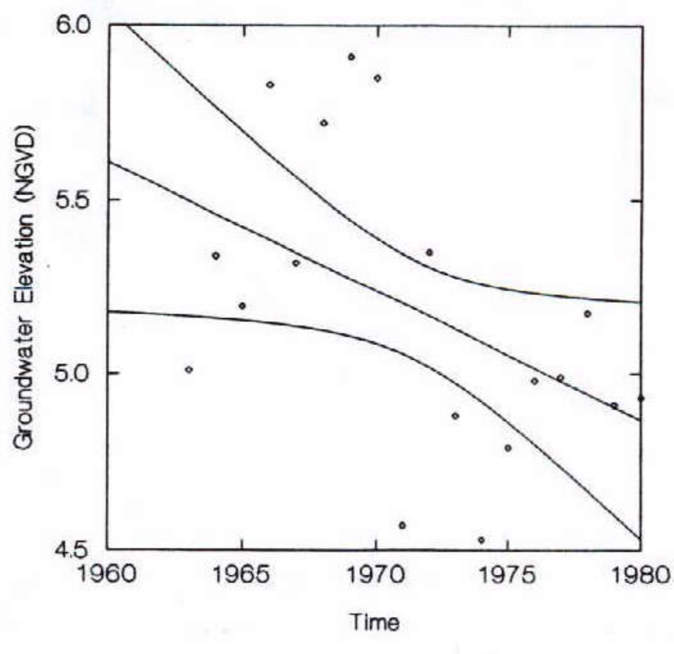
G-974 Annual Avg Groundwater Elev.



G-975 Annual Avg Groundwater Elev.



G-976 Annual Avg Groundwater Elev.



APPENDIX K

Statistical Analysis: Melaleuca Cover vs. Groundwater Elevation

Correlations Between Well Data and Melaleuca % Cover

```
THU 3/14/96 14:53:19   C:\SYSTATW5\9338\LBCOVER.SYS
PEARSON CORRELATION MATRIX

                    G970     S5T52R40

      G970          1.00
   S5T52R40        -0.64        1.00

BARTLETT CHI-SQUARE STATISTIC:    1.301 DF=    1 PROB=  .254
MATRIX OF PROBABILITIES

                    G970     S5T52R40

      G970          0.00
   S5T52R40         0.25        0.00

NUMBER OF OBSERVATIONS:     5
```

G-970 vs Sec.05-52-40

```
THU 3/14/96 14:54:36   C:\SYSTATW5\9338\LBCOVER.SYS
PEARSON CORRELATION MATRIX

                    G972     S22T52R3

      G972          1.00
   S22T52R3        -0.04        1.00

BARTLETT CHI-SQUARE STATISTIC:     .007 DF=    1 PROB=  .933
MATRIX OF PROBABILITIES

                    G972     S22T52R3

      G972          0.00
   S22T52R3         0.93        0.00

NUMBER OF OBSERVATIONS:     8
```

G-972 vs Sec.22-52-39

```
THU 3/14/96 14:55:22   C:\SYSTATW5\9338\LBCOVER.SYS
PEARSON CORRELATION MATRIX

                    G974     S12T53R3

      G974          1.00
   S12T53R3        -0.61        1.00

BARTLETT CHI-SQUARE STATISTIC:    2.512 DF=    1 PROB=  .113
MATRIX OF PROBABILITIES

                    G974     S12T53R3

      G974          0.00
   S12T53R3         0.11        0.00

NUMBER OF OBSERVATIONS:     8
```

G-974 vs Sec.12-53-39

Correlations Between Well Data and Melaleuca % Cover

THU 3/14/96 14:56:29 C:\SYSTATW5\9338\LBCOVER.SYS

PEARSON CORRELATION MATRIX

G-975 vs Sec.30-52-39

	G975	S30T52R3
G975	1.00	
S30T52R3	-0.50	1.00

BARTLETT CHI-SQUARE STATISTIC: 1.569 DF= 1 PROB= .210

MATRIX OF PROBABILITIES

	G975	S30T52R3
G975	0.00	
S30T52R3	0.21	0.00

NUMBER OF OBSERVATIONS: 8

THU 3/14/96 14:59:22 C:\SYSTATW5\9338\LBCOVER.SYS

PEARSON CORRELATION MATRIX

G-976 vs Sec.28-53-39

	G976	S28T53R3
G976	1.00	
S28T53R3	-0.51	1.00

BARTLETT CHI-SQUARE STATISTIC: 1.645 DF= 1 PROB= .200

MATRIX OF PROBABILITIES

	G976	S28T53R3
G976	0.00	
S28T53R3	0.20	0.00

NUMBER OF OBSERVATIONS: 8

THU 3/14/96 14:59:55 C:\SYSTATW5\9338\LBCOVER.SYS

PEARSON CORRELATION MATRIX

G-1488 vs Sec.29-53-39

	G1488	S29T53R3
G1488	1.00	
S29T53R3	-0.18	1.00

BARTLETT CHI-SQUARE STATISTIC: .144 DF= 1 PROB= .705

MATRIX OF PROBABILITIES

	G1488	S29T53R3
G1488	0.00	
S29T53R3	0.70	0.00

NUMBER OF OBSERVATIONS: 7

Correlations Between Well Data and Melaleuca % Cover

TUE 3/19/96 13:02:35 C:\SYSTATW5\9338\LBCOVER.SYS

		YEAR	S5T52R40	S22T52R3	S12T53R3	S30T52R3	S28T53R3	S29T53R3	S29T53R3
CASE	1	1963.00	0.50	0.20	0.50	0.00	0.04	0.00	0.00
CASE	2	1971.00	1.60	.	3.50	.	.	.	.
CASE	3	1972.00	.	2.50	.	0.00	0.23	0.00	0.00
CASE	4	1976.00	4.70	21.60	.	6.70	21.30	0.00	0.00
CASE	5	1977.00	.	.	58.80	.	.	.	.
CASE	6	1979.00	18.00	.	.	.	.	.	.
CASE	7	1980.00	.	35.00	46.70	7.60	23.90	0.00	0.00
CASE	8	1983.00	.	.	78.70	.	.	.	.
CASE	9	1984.00	.	50.80	.	3.70	24.70	0.00	0.00
CASE	10	1985.00	65.70	.	.	.	.	.	.
CASE	11	1986.00	63.20	32.70	92.80	.	17.40	0.00	0.00
CASE	12	1987.00	.	.	.	3.20	.	.	.
CASE	13	1989.00	.	52.00	99.00	.	46.00	0.50	0.50
CASE	14	1990.00	.	.	.	1.50	.	.	.
CASE	15	1992.00	100.00	93.20	100.00	22.10	83.80	59.60	59.60

15 CASES AND 20 VARIABLES PROCESSED.
NO SYSTAT FILE CREATED.

TUE 3/19/96 13:03:05 C:\SYSTATW5\9338\LBCOVER.SYS

		YEAR	G1488	G970	G972	G974	G975	G976
CASE	1	1963.00	.	.	4.62	4.42	5.52	5.01
CASE	2	1971.00	5.74	.	3.85	3.51	5.23	4.57
CASE	3	1972.00	6.46	.	4.79	4.65	6.07	5.35
CASE	4	1976.00	6.22	3.08	4.66	4.26	5.82	4.98
CASE	5	1977.00	6.22	2.91	4.36	4.12	5.81	4.99
CASE	6	1979.00	6.26	2.78	5.14	3.87	5.73	4.91
CASE	7	1980.00	6.23	2.80	5.15	3.85	5.66	4.93
CASE	8	1983.00	6.72	2.87	5.59	4.41	6.28	5.44
CASE	9	1984.00	6.49	2.84	5.41	3.31	5.90	3.99
CASE	10	1985.00	5.47	2.86	4.59	2.45	4.79	2.91
CASE	11	1986.00	6.51	2.85	5.42	2.71	5.94	3.88
CASE	12	1987.00	6.22	2.61	5.32	1.91	5.41	2.94
CASE	13	1989.00	5.39	2.47	4.40	1.28	4.57	2.15
CASE	14	1990.00	4.80	2.61	4.32	1.54	4.21	2.22
CASE	15	1992.00	6.04	2.76	4.59	2.78	4.27	4.12

15 CASES AND 20 VARIABLES PROCESSED.
NO SYSTAT FILE CREATED.